Mechanical Engineering Technology

Accreditation Report

1996-1997

Section 1 of 5

MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

COLLEGE OF TECHNOLOGY
Ferris State University
EXCELLENCE • HERITAGE • QUALITY • SERVICE • COMMITMENT

Self Study
for review of the

Associate Degree Program in
MECHANICAL ENGINEERING TECHNOLOGY

Volume II -- The Program

prepared for the

TAC/ABET ACCREDITATION SITE VISIT

September 3, 1996

VOLUME II

QUESTIONNAIRE FOR REVIEW
of
PROGRAMS IN ENGINEERING TECHNOLOGY

Mechanical Engineering Technology
[Program Title]

Submitted by

Ferris State University
[Name of Institution]

September 3, 1996
[Date]

to the

Technology Accreditation Commission
of the
Accreditation Board for Engineering and Technology, Inc.

111 Market Place, Suite 1050
Baltimore, Maryland 21202

ET 27A
Revised October 1995

Instructions

A. CONTENT. A separate Volume II is required for each program being submitted for evaluation except in the case of the programs offering associate and bachelor's degrees in the same major under the same program title [2+2 programs]. These may be combined in the same Volume II, but curricular requirements [pages II-3 to II-8] must be tabulated separately for the two programs. Closely related programs as explained in section V.F.4.d. of the ABET criteria may be bound together into a single Volume II.

B. PREPARATION

1. Be sure to include the program title on the cover for each Volume II. The title should always be given exactly as it is listed in the institution's catalog and intended to be listed in the official tabulation of accredited programs in the *ABET Accreditation Yearbook.*

2. Please refer to the general instructions included in Volume I for detailed information on preparing and assembling the questionnaire. If you have any questions, call your team chair. If one has not yet been nominated, contact Mr. James Ware, Accreditation Director for TAC of ABET at [410] 347-7720.

VOLUME II

ENGINEERING TECHNOLOGY PROGRAM

Table of Contents

I FACULTY

A. Faculty Profile

Complete the table below for all faculty members, full-time (FT) and part-time (PT) who teach or are responsible for content of the technical courses in this program. (This should summarize the detailed information provided under C below.) Use additional sheets as necessary. For the third column dealing with FT/PT status, indicate whether the individual has FT or PT appointment at the institution. *In the fourth column,* indicate FTE devoted to the program being reported *(one faculty member cannot be listed as more than 1.0 FTE). Use the first line to list the person responsible for the program.*[1]

Key to Faculty Profile Table

Column	Item
1	Name, Title
2	Academic Rank
3	Full Time (FT) or Part Time (PT) Appointment (Institution)
4	Full-Time Equivalency (FTE) (Program)
5	Education: Degree, Field, Year
6	Date hired
	Years Teaching Experience
7	Engineering Technology/Engineering
8	Other (Specify: Industrial Technology, Vocational, High School, etc.)
9	Years Technical Experience in Engineering Technology/Engineering
10	Check if basic credentials are met
11	Technical Society Memberships, Professional Registrations, etc.
12	Check Box if Active

1 TAC/ABET Questionnaire instructions are shown in italics. Footnote numbering restarts in each section.

I.A. FACULTY (continued)

FACULTY PROFILE TABLE

1	2	3	4	5	6	7	8	9	10	11	12
Full Name Title of Position	Academic Rank	FT or PT Inst	FTE Program F-W Avg 1995-96	Education Degree Field Year	Date Hired	Years Teaching Experience ET/Engr	Other	Years Technical Experience ET/Engr		Technical Society Memberships	
Person Responsible for Program George R. Olsson[2]	Professor	FT	.44	BS Engr Sci 1958 MS Physics 1962 PhD Aero 1967	9/79	18	2 (Math)	17	X		
Charles G. Drake[2,3]	Assistant Professor	FT	.44	BS Math 1973 MSME 1992	9/90	6		13	X	ASME, SME ASEE, ASTM ASES Registered PE	X
Richard Goosen[4]	Assistant Professor	FT	.17	BSE 1974 BSEE 1978 MSEE 1985	9/92	4		12	X	IEEE ANSI AGVS Safety Subcommittee	X
Scott M. Thede[5]	Adjunct Instructor	FT	.08	AAS IET 1985 BS EEET 1990	1/88	1		1			
		Total	**1.13**								

2 Program faculty also are responsible for teaching sections of MECH 240 Statics and Strength of Materials and MECH 250 Fluid Power with Controls for students in a number of other programs. These support courses account for a significant portion of the program faculty teaching load.

3 Mr. Drake also teaches CADD 490 ALGOR and Mold-flow for students in other programs.

4 Mr. Goosen's primary area of responsibility is in the BS program in Product Design Engineering Technology. He teaches MECH 222 Machine Design for mechanical engineering technology students as well as sections of MECH 240 for students in other programs.

5 Mr. Thede, who is responsible for the College of Technology computer network systems, software and laboratories, taught MECH 122 Computer Applications in Technology, Winter Semester 1996.

I. **FACULTY** (continued)

B. **Teaching Assignments**

Furnish for this engineering technology curriculum a tabulation of teaching assignments for the current academic year. List for each faculty member, both full-time and part-time: the courses taught each term; number of sections; hours of lecture; recitation, laboratory, and total contact hours.

TABLE OF TEACHING ASSIGNMENTS: 1995 - 1996 SCHOOL YEAR

Instructor	Course Prefix/No.	Semester	Course Title	Lecture Hours	Lab Hours	Sections	Contact Hours	Total Contact Hours
George R. Olsson	MECH 212	Fall 1995	Kinematics of Mechanisms	2	0	1	2	
	MECH 240		Statics & Strength of Materials	4	0	2	8	**10**
	MECH 221	Winter 1996	Mechanical Measurements with Computer Applications	3	3	1 lecture 2 lab	9	
	MECH 223		Thermodynamics and Heat Transfer	3	0	1	3	
	MECH 240		Statics & Strength of Materials	4	0	1	4	**16**
	MECH 240	Summer 1996	Statics & Strength of Materials	4	0	1	4	**4**
Charles G. Drake	MECH 211	Fall 1995	Fluid Mechanics	3	3	1 lecture 2 lab	9	
	MECH 240		Statics & Strength of Materials	4	0	1	4	
	MECH 111		MET Seminar	1	0	1	1	**14**
	MECH 250	Winter 1996	Fluid Power with Controls	1	2	2 lecture 4 lab	10	
	CADD 490		ALGOR & Mold Flow	2	3	2 lecture 2 lab	10	**20**
	MECH 240	Summer 1996	Statics & Strength of Materials	4	0	1	4	
	CADD 490		ALGOR & Mold Flow	2	3	2 lecture 2 lab	10	**8**

TABLE OF TEACHING ASSIGNMENTS: 1995 - 1996 SCHOOL YEAR (continued)

Instructor	Course Prefix/No.	Semester	Course Title	Lecture Hours	Lab Hours	Sections	Contact Hours	Total Contact Hours
Richard Goosen	MECH 240	Fall 1995	Statics & Strength of Materials	4	0	1	4	10
	PDET 411		Machine Design	3	0	1	3	
	PDET 413		Thermodynamics and Applied Fluid Mechanics	3	0	1	3	
	MECH 222	Winter 1996	Machine Design	4	0	1	4	11
	PDET 321		Dynamics and Kinematics	3	0	1	3	
	PDET 422		Advanced Machine Design with FEA	3	1	1 lecture 1 lab	4	
Scott Thede	MECH 122	Winter 1996	Computer Applications in Technology	2	0	1	2	2

I. FACULTY (continued)

C. Biographical data format

Furnish the following information for each faculty member, both full-time and part-time, who holds an academic appointment in the engineering technology unit and whose work affects the program for which accreditation is requested. Please arrange these sheets alphabetically. [The institution may include resumes with various formats, provided the following information is included.][1]

1. *Name*
2. *Department/section/program*
3. *Date hired or assigned to department/section/program*
4. *Number of years of service to department/section/program*
5. *Present academic rank and date obtained*
6. *Degrees [state field, institution, and date of graduation]*
7. *Other teaching experience [state where, dates, and in what capacity]*
8. *Full-time industrial experience [state where, dates, and in what capacity]*
9. *Part-time industrial experience [state where, dates, and in what capacity]*
10. *Consulting work [brief description, including dates and nature of work during the past five years]*
11. *Professional recognition -- Indicate*
    - *[a] if registered as a professional engineer, Licensed Surveyor or Architect, and name the State[s] of registry*
    - *[b] if certified by the National Institute of Certification in Engineering Technologies, give date and classification*
    - *[c] if a Certified Manufacturing Engineer or Quality Engineer, give expiration date*
    - *[d] other applicable certifications*
12. *Principal publications during the last five years [give bibliographic notation]*
13. *Scientific and technical societies of which a member [state grade, any offices held, committee assignments, other activity*
14. *Honors and Awards*
15. *Specify programs and activities to maintain and enhance professional competence in which participated during the last five years.*
16. *Other duties performed for regular base salary during academic year, with average hours per week*
17. *Other duties performed for extra compensation during academic year, with average hours per week*
18. *Recent summer or other assignments not shown above*
19. *Any other pertinent information related to teaching effectiveness, professional activities or service to the engineering technology unit*

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1 *NOTE: In some cases, the team chair for the visit may request additional biographical data and verification of these data.*

BIOGRAPHICAL DATA

1. *Name* **Charles G. Drake**

2. *Department:* Manufacturing Engineering Technologies
   Program: Mechanical Engineering Technology Program

3. *Date hired:* 9/2/1990

4. *Years service:* 6

5.. *Academic Rank*: Assistant Professor, 1992

6. *Degrees:* B.S., Mathematics, Lake Superior State College, 1974
   M.S., Mechanical Engineering, Michigan Technological University, 1992

7. *Other teaching experience:*

   Graduate Teaching Assistant, 1974 - 1977
   Taught engineering graphics and statics
   Mechanical Engineering - Engineering Mechanics Department
   Michigan Technological University
   Houghton, Michigan

8. *Full-time industrial experience:*

   Test Engineer, 1985 - 1989
   Engineering Test Section
   Product Development Laboratory
   Reynolds Metals Company
   Richmond, Virginia

   Design Engineer, 1977 - 1985
   Engineering Department
   Product Development Laboratory
   Reynolds Metals Company
   Richmond, Virginia

9. *Part-time industrial experience:*

   None

10. *Consulting work (Last five years):*

    Finite element analysis on plastic automotive part, June 1995
    Harcourt & Associates
    Stanwood, Michigan

Charles G. Drake (continued)

Finite element analysis on machine platen, May 1996
Brown Machine Division
Trafalgar House, Inc.
Beaverton, Michigan

11. *Professional recognition:*

Registered Professional Engineer
State of Michigan
Commonwealth of Virginia

12. *Principal publications of last five years:*

None

13. *Scientific and professional societies of which a member:*

American Society of Mechanical Engineers, Member
Society of Manufacturing Engineers, Senior Member
American Society of Engineering Educators, Member
American Society for Testing of Materials, Member
American Solar Energy Society
Richmond, Virginia Chapter, Program Chair, 1979 - 1981
Michigan Society of Professional Engineers,
Big Rapids Chapter, Scholarship Chair, 1995 - present

14. *Honors and awards:*

Graduated with high honors, 1974
Lake Superior State College

Alpha Chi honorary, 1974
Lake Superior State College

Pi Tau Sigma engineering honorary, 1975
Michigan Technological University

15. *Specific programs and activities to maintain and enhance professional competence in which participated during the last five years:*

Algor (finite element analysis software training) Week 1, September 20 - 24, 1993

Algor Week 2, August 15 - 19, 1994

Algor Seminar for Educators, July 12 - 14, 1994

Autocad faculty workshop, January 1995

Audited instruction on Moldflow analysis software, Fall semester, 1995

Charles G. Drake (continued)

16. *Other duties performed for regular base salary during academic year, with average hours per week.*

Responsible for Fluid Mechanics/Fluid Power Laboratory (2 hours/week)

Student Tutoring and Advising (4 hours/week)

Department Curriculum Committee member (variable activity)

17. *Other duties performed for extra compensation salary during academic year, with average hours per week:*

Pre-Apprentice Training for Diesel Technology Corporation
(3 - 6 hours per week over 6 weeks, Fall 1994 and Fall 1995)
Technology Transfer Center
Ferris State University

18. *Recent summer assignments not shown above:*

Summer teaching assignments:

MECH 240 Statics and Strength of Materials, 1996
PDET 422 Advanced Machine Design with Finite Element Analysis, 1996
MECH 240 Statics and Strength of Materials, 1995
MET 225 Statics and Strengths of Materials, 1993
Preparation for teaching MECH 240 Statics and Strength of Materials in a distance learning format, 1/4 contract, 1993
Special topics courses enabling off campus students to complete degrees:
MECH 222 Machine Design, Winter 1993
MECH 240 Statics and Strengths of Materials, Summer 1995

19. *Any other pertinent information related to teaching effectiveness, professional activities or service to the engineering technology unit:*

Session Chair and Steering Committee Member, Midwest Regional Meeting
American Society for Engineering Education
Ferris State University
Big Rapids, Michigan
April 1996

1.	*Name:*	**Richard Goosen**
2.	*Department:* *Program:*	Manufacturing Engineering Technologies Product Design Engineering Technology Program
3.	*Date hired:*	9/3/92
4.	*Years service:*	4
5..	*Academic Rank:*	Assistant Professor, 1992
6.	*Degrees:*	B.S., Engineering, US Military Academy, 1974 B.S., Electrical Engineering, Kansas State University, 1978 M.S., Electrical Engineering, Ohio University, 1985
7.	*Other teaching experience:*	Assistant Instructor, Department of Chemistry Kansas State University, 1978
8.	*Full-time industrial experience:*	Avionics Systems Design Engineer, 1978 - 1983 Lear Siegler Instrument Division Grand Rapids, Michigan Product and Training Manager, 1984 - 1985 Bell and Howell, Mailmobile Division Zeeland, Michigan Technical Manager, 1985 - 1989 Mannesmann Demag, AGVS Grand Rapids, Michigan Product Manager, 1989 - 1992 Rapistan Demag, Integrated Systems Grand Rapids, Michigan
9.	*Part-time industrial experience:*	None.
10.	*Consulting work last five years*	Technical Advisor for Development of AGVS Inertial Guidance, 1992 - present (Automated Material Handling) Rapistan Demag Grand Rapids, Michigan Design Consultant for Automatic Desk Leveler, 1994 Rapidline Design Grand Rapids, Michigan

11. *Professional recognition:*

Registered Professional Engineer, 1985 - present
State of Ohio

Richard Goosen (continued)

12. *Principal publications of last five years:*

    None

13. *Scientific and professional societies of which a member:*

    IEEE, 1978 - present
    ANSI, AGVS Safety subcommittee, 1988 - 1992

14. *Honors and awards:*

    Eta Kappa Nu, 1978
    Electrical Engineering Honorary

    Phi Beta Phi
    Academic Honorary

15. *Specific programs and activities to maintain and enhance professional competence in which participated during the last five years:*

    FEA Training, Linear Stress Analysis, 11/95
    Chicago, Illinois

16. *Other duties performed for regular base salary during academic year, with average hours per week.*

    Student Organization Advisor (1 hour per week)

    Student Tutoring and Advising (6 hours/week)

17. *Other duties performed for extra compensation salary during academic year, with average hours per week:*

    None

18. *Recent summer assignments or other assignments not shown above:*

    PDET 413 Thermodynamics and Applied Fluid Mechanics, Summer 1995

19. *Any other pertinent information related to teaching effectiveness, professional activities or service to the engineering technology unit:*

    None.

1. *Name* **George R. Olsson**

2. *Department:* Manufacturing Engineering Technologies
Program: Mechanical Engineering Technology Program

3. *Date hired:* 9/4/79

4. *Years service:* 17

5.. *Academic Rank*: Professor, 1987

6. *Degrees:* B.S., Engineering Science, Case Institute of Technology, 1958
M.S., Physics, Drexel Institute of Technology, 1962
Ph.D., Aerospace Engineering, University of Michigan, 1967

7. *Other teaching experience:*

Instructor, 1976 - 1979 (Part Time)
Mathematics Department
Washtenaw Community College
Ann Arbor, Michigan

Instructor, 1977 - 1979 (Part Time)
Science & Technology Division
Weekend College
Wayne State University
Detroit, Michigan

8. *Full-time industrial experience:*

Aeronautical Research Scientist, 1958 - 1960
8'×6' Wind Tunnel Branch
Lewis Research Center
National Aeronautics and Space Administration
Cleveland, Ohio

Senior Engineer, 1960 - 1962
Space Systems Division
Martin Company
Baltimore, Maryland

Project Scientist, 1967 - 1971
Booz, Allen Applied Research, Inc.
Bethesda, Maryland

Postdoctoral Research Fellow, 1971 - 1972
Highway Safety Research Institute
University of Michigan
Ann Arbor, Michigan

George R. Olsson (continued)

Advanced Systems Design Specialist, 1974
Chrysler Defense Division
Sterling Heights, Michigan

9. *Part-time industrial experience:*

Assistant Research Engineer, 1962 - 1967 (Part Time and Full Time)
Aerospace Engineering Department
University of Michigan
Ann Arbor, Michigan

Proprietor, 1972 - 1979 (Part Time and Full Time)
Olsson Scientific Services
Ann Arbor, Michigan

10. *Consulting work (Last five years):*

Designed a towing-tank test facility and prepared a plan of experiments for the development and evaluation of fishing lure devices.
Technology Transfer Center, Ferris State University, Big Rapids, Michigan
1992

11. *Professional recognition:*

None

12. *Principal publications of last five years:*

None

13. *Scientific and professional societies of which a member:*

None

14. *Honors and awards:*

Elected Associate Member, The Society of the Sigma Xi, 1966
Honorary professional society dedicated to scientific research

Awarded Research Fellowship in Highway Safety Research, 1971 - 1972
Highway Safety Research Institute
University of Michigan, Ann Arbor, Michigan

Listed in American Men and Women of Science, 1969

15. *Specific programs and activities to maintain and enhance professional competence in which participated during the last five years:*

Sabbatical leave, 1990 - 1991
Visiting Fellow, Department of Education and Department of Mechanical Engineering
Loughborough University of Technology, Loughborough, England

George R. Olsson (continued)

Strain Measurement Workshop, July 17 - 21, 1992
Micro-measurements, Inc.
Raleigh, North Carolina

Distance Learning Workshop, June 26 - 27, 1993
IBM Educational Division
Big Rapids, Michigan

16. *Other duties performed for regular base salary during academic year, with average hours per week.*

Responsible for Mechanical Measurements Laboratory (2 hours/week)

Student Tutoring and Advising (4 hours/week)

Directed study courses for small groups of students (usually 1 to 4, 1 or 2 credits)
MECH 297, PDET 497

17. *Other duties performed for extra compensation salary during academic year, with average hours per week:*

None

18. *Recent summer assignments not shown above:*

MET 225 Statics & Strength of Materials, 4 quarter credits, Summer 1993
MECH 240 Statics & Strength of Materials, 4 semester credits, Summer 1996

Preparation for teaching MECH 240 Statics and Strength of Materials in a distance learning format, 1/4 contract, Summer 1993

19. *Any other pertinent information related to teaching effectiveness, professional activities or service to the engineering technology unit:*

Chair, Session on Metal Forming, April 19, 1996
Midwest Regional Meeting
American Society for Engineering Education
Ferris State University
Big Rapids, Michigan

Representative for College of Technology, 1996 -
University Steering Committee for NCA Accreditation

Chair, Faculty Research Committee, 1987 - 1988

1.	*Name:*	**Scott Michael Thede**
2.	*Department:* *Section:*	Manufacturing Engineering Technologies Computer Support
3.	*Date Hired:*	1/1/88
4.	*Years service:*	8
5.	*Academic Rank:*	Part Time Adjunct Instructor
6.	*Degrees:*	A.A.S. Industrial Electronics, 1985, Ferris State University B.S. Electricity/Electronics Engineering Technology, 1990, Ferris State University
7.	*Other teaching experience:*	Seminar Leader, 1989 CAD instruction to Costa Rica Spanish speaking students CAD Department Ferris State University Big Rapids, MI 49307 Part-Time Instructor, 1990 MET250 Mechanical Measurements with Computer Application, Laboratory Section CAD Department Ferris State University Big Rapids, MI 49307 Part-Time Instructor, 1994 MFGE 313 Computer Applications in Manufacturing Manufacturing Engineering Technologies Department Ferris State University Big Rapids, MI 49307 Part-Time Instructor, 1995 MECH 122 Computer Applications in Technology Manufacturing Engineering Technologies Department Ferris State University Big Rapids, MI 49307
8.	*Full-time industrial experience:*	None
9.	*Part-time industrial experience:*	Computer support for several large companies in the Big Rapids area.

Scott M. Thede (continued)

10.	*Consulting work:*	Technical project manager Unionville/Sebewaing Area Schools Sebewaing, MI 48759 (5.6 million dollar project)
11.	*Professional recognition:*	None
12.	*Principal publications of last five years:*	None
13.	*Scientific and professional societies of which a member:*	None
14.	*Honors and awards:*	Nominated for staff member of the year at Ferris State University

15. *Specific programs and activities to maintain and enhance professional competence in which participated during the last five years:*

None

16. *Other duties performed for regular base salary during academic year, with average hours per week:*

Chair of the TechNet group in the College of Technology
Member of a campus wide network group for the past six years

17.	*Other duties performed for extra compensation:*	None
18.	*Recent summer assignments not shown above:*	None

19. *Any other pertinent information related to teaching effectiveness, professional activities or service to the engineering technology unit:*

None

I. **FACULTY** (continued)

D. **Faculty basic credentials**

For those program faculty members who do not explicitly meet ABET criteria for faculty basic credentials, explain why the institution feels the individual should be considered to meet basic credential criteria. Include only faculty members, full-time and part-time, who teach specific technology courses in the program. Do not include service area faculty or administrators who do not teach specific technology courses. For any master degree that is not engineering or engineering technology, the institution must document the analytical nature of the degree and the appropriateness of the degree for the engineering technology program offered.[1]

All the regular full-time program faculty members meet ABET criteria for faculty basic credentials.

Mr. Thede, Adjunct Instructor, who is responsible for the College of Technology computer network systems, software and laboratories, taught MECH 122 Computer Applications in Technology (2 credits) in Winter Semester 1996. This course is offered to first year students in the Mechanical Engineering Technology program. Mr. Thede has an Associate's degree in Industrial Electronics Technology and a Bachelor's degree in Electrical and Electronic Engineering Technology. He is well qualified to teach this first-year course.

II. **CURRICULAR REQUIREMENTS FOR GRADUATION FROM THE PROGRAM**

A. **General**

Type of program: Day **X** *Evening* ___ *Cooperative* ___ *Non-Traditional* ___

Length of school year **9** *months. Credits: Semester* **X** *Quarters* ___

1 Lecture Credit = **1** *Class Hour[s] 1 Laboratory Credit =* **2** or **3** *Class Hours[s]*

One semester credit-hour normally represents a total of three preparation and class hours of work per week for a period of 14 to 16 weeks depending on the institution's academic year. Quarters are proportional.

General Teaching Load Averages

Indicate in the space provided, ranges and average data for program faculty members having a full-time assignment in the engineering technology unit. Give actual data for the current semester or quarter.

Data are for **X** *semester* ___ *quarter*

	Range	Average
Credit Hours	10 - 12	11
Contact Hours Per Week	16 -20	18
Laboratory Size	8 - 16	12
Class Size	17 - 35	22
Advisees	22 - 28	25

1 *Note: Section V.F.2. of ABET criteria allows for limited exceptions to strict adherence to the basic credentials as long as the intent of the criteria is met. However, the institution must clearly and completely document that the faculty member meets the intent of the basic credentials criteria, section V.F.1.*

II.A. CURRICULAR REQUIREMENTS FOR GRADUATION FROM THE PROGRAM (continued)

Indicate the number of credit and contact hours per week that is considered a normal full teaching load.

Credit Hours **12** *Contact Hours* **18**

Explain how a full-time load is determined.

A full-time teaching load is determined by whichever maximum limit is reached first:

12 Credit Hours or **18** Contact hours or **360** Student Credit Hours

II. CURRICULAR REQUIREMENTS FOR GRADUATION FROM THE PROGRAM (continued)

B. Production of graduates

Have students been graduated from the program? **X** *Yes* ___ *No [The Technology Accreditation Commission will not evaluate a program until students have been graduated.]*

C. Curriculum

List the courses making up the curriculum required for graduation, according to the categories described in the ABET criteria.

Technical Sciences *(See ABET criteria, section V.C.1.)*

Courses (Title & No.)	Required Hours: Lecture	Lab.	Credits
MECH 211 Fluid Mechanics	3	3	4
MECH 223 Thermodynamics and Heat Transfer	3	0	3
MECH 240 Statics and Strength of Material	4	0	4
EEET 215 Electricity and Electronics for MET Students 1[1]	3	3	4
EEET 225 Electricity and Electronics for MET Students 2	3	3	4
MATL 240 Introduction to Material Science[1]	3	2	4
Subtotal	**19**	**11**	**23**

Technical Specialties *(See ABET criteria, section V.C.2.)*

Courses (Title & No.)	Required Hours: Lecture	Lab.	Credits
MECH 111 MET Seminar	1	0	1
MFGT 190 Manufacturing Processes	1	3	2
ETEC 140 Engineering Drawing and CAD	2	3	3
MECH 212 Kinematics of Mechanisms	2	0	2
MECH 221 Mechanical Measurements with Computer Applications	3	3	4
MECH 222 Machine Design	4	0	4
Subtotal	**13**	**9**	**16**

1 The MET curriculum has been revised, effective Fall 1996. The new Curriculum Guide Sheet is presented in Appendix A. EEET 225 and MATL 240 have been dropped in favor of a second physical sciences course (PHYS 212) and an applied calculus course (MATH 216). Appendix B contains the related curriculum proposal.

II.C. CURRICULAR REQUIREMENTS FOR GRADUATION FROM THE PROGRAM (continued)

Technical Electives *(See ABET Criteria, section V.C.3.)*

Courses (Title & No.)	Required Hours Lecture	Lab.	Credits
None	0	0	0
Subtotal	**0**	**0**	**0**

Basic Sciences *(See ABET Criteria, section V.C.4.)*

Courses (Title & No.)[1]	Required Hours Lecture	Lab.	Credits
PHYS 211 Introductory Physics 1	3	3	4
Subtotal	**3**	**3**	**4**

Mathematics *(See ABET Criteria, section V.C.4.)*

Courses (Title & No.)	Required Hours Lecture	Lab.	Credits
MATH 116 Intermediate Algebra and Trigonometry	4	0	4
MATH 126 Advanced Algebra and Analytic Trigonometry	4	0	4
Subtotal	**8**	**0**	**8**

1 Effective Fall 1996, a second physical sciences course (PHYS 212 Introductory Physics 2: 3 lecture, 3 lab, 4 credits) and an applied calculus course (MATH 216 Applied Calculus: 4 lecture, 0 lab, 4 credits) are being added to the program. Appendix A contains the new Curriculum Guide Sheet and Appendix B presents the related curriculum proposal.

II.C. CURRICULAR REQUIREMENTS FOR GRADUATION FROM THE PROGRAM (continued)

Written & Oral ***Communications*** *(See ABET Criteria, section V.C.5.a)*

Courses (Title & No.)	Required Hours: Lecture	Lab.	Credits
ENGL 150 English 1	3	0	3
ENGL 250 English 2	3	0	3
Subtotal	**6**	**0**	**6**

Humanities & Social Sciences *(See ABET criteria, section V.C.5.b)*[1]

Courses (Title & No.)	Required Credits
Cultural Enrichment Elective[2]	3
ARTH 111 Renaissance Through 20th Century (3)	
HIST 152 Western Civilization: 1500 AD to the Present (3)	
HUMN 100 Introduction to the Humanities (3)	
HUMN 102 Renaissance to the Twentieth Century (3)	
Social Awareness Elective[2]	3
PSYC 150 Introduction to Psychology (3)	
SOCY 121 Introductory Sociology (3)	
GEOG 100 Geography of World Regions (3)	
ANTH 121 Introduction to Physical Anthropology (3)	
Subtotal	**6**

1 *The institution should only list the most commonly taken courses. Do not exceed ten courses. Specify the total required credits only.*

2 General Education requirements are listed in the University Catalog 1995-97, pages 58-63 (Attachment 3).

II.C. CURRICULAR REQUIREMENTS FOR GRADUATION FROM THE PROGRAM (continued)

Computer Courses *(See ABET Criteria, section V.C.6.)*

Courses (Title & No.)	Required Hours: Lecture	Lab.	Credits
MECH 122 Computer Applications in Technology	2	0	2
Subtotal	**2**	**0**	**2**

Other Courses

Courses (Title & No.)	Required Hours: Lecture	Lab.	Credits
None	0	0	0
Subtotal	**0**	**0**	**0**

Recap of MET Program Course Categories	Lecture	Lab	Credits
Technical Sciences	19	11	23
Technical Specialties	13	9	16
Technical Electives	0	0	0
Basic Sciences	3	3	4
Mathematics	8	0	8
Written & Oral Communication	6	0	6
Humanities & Social Sciences	6	0	6
Computer Courses	2	0	2
Other Courses	0	0	0
Total Required Credits	**57**	**23**	**65**

NOTE: The institution should review section III.B.1.c.9. of the ABET criteria. Course outlines and textbooks must be available to the visitation team for all courses required for graduation. For technical, mathematics and science courses there must also be sufficient examples of student work, in addition to course outlines and textbooks, available to the visitation team.

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Section 2 of 5

III. FOLLOW-UP WITH GRADUATES AND EMPLOYERS

NOTE: The institution must be able to present data and documentation demonstrating the placement and satisfactory employment of its graduates in positions appropriate to the purposes of the program. Information is specifically required showing employer satisfaction with graduates, graduates' satisfaction with employment, career mobility opportunities, appropriate starting salaries, and appropriate job titles. No specific format is prescribed by ABET for the collection and presentation of such data, but information should be current and reasonably complete.

A. Employment history

Discuss the recent employment history of the graduates of the engineering technology program. What specific industrial organizations have recruited on campus? What has been the hiring history with respect to starting salaries, job titles, responsibilities assigned, and subsequent promotions? What percentage of graduates continue in advanced study? What percentage have not obtained satisfactory employment? Do the program faculty assist students in finding employment?

Companies recruiting on campus

Over 175 employers recruit at Ferris at least once per year and 95 employers participated in the most recent job fair. Lists of companies that have recruited graduates in mechanical engineering technology (and/or in the programs they ladder into) are available in the Career Planning and Placement Office.

Hiring history

Most mechanical engineering technology (MET) graduates (over 80% in the last decade) continue their education and pursue bachelor's degrees. Thus, their placements and starting salaries usually are commensurate with graduates of the programs they ladder into. The most popular laddering choices for MET graduates have been the B.S. programs in Manufacturing Engineering Technology, Product Design Engineering Technology and Plastics Engineering Technology at Ferris. Thus, the starting salaries for MET graduates are best represented by those of the programs into which they matriculate.

BEGINNING ANNUAL SALARY DATA 1994-95[1]

Bachelor's Degree Program	Respondents working in related field	Average Salary	Range	
			Low	High
Manufacturing Engineering Technology	13	34 000	26 000	42 000
Product Design Engineering Technology	19	31 000	18 000	53 000

For those MET graduates who immediately seek employment (too few in number to form an adequate statistical sample), their potential starting salaries may be represented by the average beginning salaries for all associate degree graduates of the College of Technology. In 1994-95 this was about $21 000.[1]

1 A Study of 1994-95 Graduates and Their Beginning Salaries. Prepared by Career Planning and Placement Services, pages 24-27 (Attachment 4).

III.A. FOLLOW-UP WITH GRADUATES AND EMPLOYERS (continued)

The placement profile for graduates of these related B.S. programs is presented in the next table.

PLACEMENT PROFILE FOR GRADUATES[1]

Bachelor's Degree Program	Employed		Continuing Education	Seeking Employment	Unknown	TOTAL
	Major Field	Not Related				
Manufacturing Engineering Technology	25	2	0	1	3	31
Product Design Engineering Technology	21	0	0	1	7	29

Faculty assistance for students seeking employment
The faculty assist graduating students and alumni in finding employment in several ways:

(1) Referral calls for organizations seeking mechanical engineering technology (MET) graduates come through via the Career Planning and Placement Office and also directly from the companies themselves. This information is relayed to interested students and alumni.

(2) Students and alumni request faculty assistance in finding employment. Faculty supply suggestions of target companies for applications and write letters of recommendation, as needed.

(3) Via the MET program Industry Advisory Committee, the faculty informs potential employers of the relevant skills and availability of MET graduates.

B. **Surveys and records**
Describe the extent of surveys and records on the performance of graduates from this program. Who is responsible for such surveys? Also describe how feedback information from employers and graduates is used to improve the educational program. Be specific.

Surveys and records of graduates
Surveys of graduates of the Mechanical Engineering Technology program are conducted at three levels:

(1) Surveys prepared by the Career Planning and Placement Office. These annual surveys focus on current graduates from programs across the University.

(2) Alumni surveys prepared by the College of Technology. These surveys usually are conducted biannually and are sent to all alumni of the programs in the College.

(3) Departmental surveys. These surveys are specially prepared and focus on particular programs.

III.B. FOLLOW-UP WITH GRADUATES AND EMPLOYERS (continued)

This problem is being addressed in a number of ways:

(1) The outcomes assessment initiative.[2] In the next school year each program, as part of its Unit Action Plan, will develop an outcomes assessment plan. Implementation of these plans will be strongly supported. A key element of their execution will be improved survey techniques that will focus on obtaining higher response rates and acquiring statistically valid samples.

(2) Simplified post-card surveys. A new approach to surveying program alumni is to use a survey document that fits on a return postage-paid postcard. (Alternatively, the respondent may FAX a prepared single page.) Such a survey of mechanical engineering technology alumni has just been sent out and results should be available in time for the TAC of ABET team visit.

(3) Telephone surveys. Steps are being taken to use a specially prepared and scripted telephone dialog to accomplish high response rate alumni surveys. This approach is in the process of being implemented and is supported by the outcomes assessment initiative.

(4) MET students in their fourth semester, just prior to graduation, are being surveyed in the classroom regarding their plans. This approach acquires a response from the entire population of current graduates.

C. Graduate/employer follow-up procedures

Discuss the perceived strengths and limitations of the graduate/employer follow-up and feedback procedures. With each limitation indicate possible actions to improve the process.

Survey Instruments

Contacts between the program faculty and the graduates involve both survey instruments and word of mouth interactions. The survey instruments are designed to elicit feedback on the comparative value of the educational components of the program and to receive input regarding new directions. Typical topics in the surveys include:

Gender
Current annual salary
Employer's industry category
Job title/classification
Additional education
Ferris program effectiveness in preparation for employment
Satisfaction with educational experience at Ferris
Most/least valuable part of course work
Need for continuing education
Participation in continuing education

It is anticipated that the approaches outlined in the previous section will sharpen the utility of these surveys.

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2 Achieving Academic Success: A Plan for Assessing Academic Outcomes, Ferris State University, December 1995 (Attachment 2). Also, see the Unit Action Plans (Appendix G).

III.C. FOLLOW-UP WITH GRADUATES AND EMPLOYERS (continued)

Industry Advisory Committee
An Industry Advisory Committee for the Mechanical Engineering Technology program has been in existence since the program's inception. The members represent a cross-section of businesses across the state.[3] This Committee usually meets annually. Program faculty and administrators present the current state of the program and delineate future initiatives. Members' comments are solicited and incorporated into the program planning process.

IV. FOLLOW-UP ACTION ON PREVIOUS TAC OF ABET VISIT

If this is a re-accreditation visit, list the requirements and recommendations for corrective action that were made for the institution and this program and indicate what has been done to respond to each of them. [Suggestions for improvement do not mandate a response, but important improvements should be noted.]

N/A.

3 Companies represented on the MET program Industry Advisory committee are listed in Appendix C.

V. FINANCES RELATED TO THE PROGRAM

Indicate. below the operating funds allotted to the engineering technology program during the current school year and during the school year of the last previous ABET visit (or five years ago if this is an initial visit). Exclude funds for addition to physical facilities.

Mechanical Engineering Technology Program Budget[1]

Purpose	$ Amount and Year	
	Most Recent Year 1995 - 1996	1992 - 1993
Administrative Salaries and Expenses[2]	0	0
Salaries - Teaching[3]	226 199	162 665
Other Salaries (student assistant)	765	675
Supplies	2 832	1 387
Maintenance	85	189
Promotional Expense	0	0
New Equipment	0	2 427
Replacement Equipment	0	0
Research	0	0
Faculty Development	743	600
Staff Development	0	0
Other (Specify): Gifts[4]	370	300
Total $:	230 994	168 243

VI. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM

The purpose of this section is to provide guidance for the person in charge of the engineering technology program in making a detailed self-appraisal. In order to be of value it is essential that the topics listed be fully developed in an expository manner.

A. Mission, Goals and Objectives of the instructional program

Indicate in a narrative form the mission, goals and objectives of this program and explain the methods of attaining each (see section V.B.3. of ABET criteria).

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1 Appendix E contains the current 1995-96 and the 1996-97 requested MET program budgets. Data for 1991-92 (five years ago) were not available.

2 Administrative expenses are not billed to the program.

3 Most recently available faculty salaries are for 1994-1995.

4 Gift income was used for faculty development and for lab supplies.

VI.A. **OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM** (continued)

The Goals and Objectives of the MET Program

(1) To provide the skills, knowledge, experience, and applications to make the graduate employable and able to advance in mechanical engineering technology-related professions,

(2) To provide outreach activities and professional development to the students, and

(3) To make available training and educational services to business, industry, and education.

These outcomes are measured by use of follow-up studies to graduates and their employers. Sometimes the follow-up is a phone conversation between a faculty member and the graduate. Continued evaluation of lab-based activities is accomplished by faculty and Industry Advisory Committee members. Student involvement in professional organizations such as ASME will be encouraged.

Follow-up studies with business and industry provide feed-back on the effectiveness of applicable educational units.

B. **Program history**
Thoroughly discuss the evolution of this program from its original concept to the present, explaining the rationale for each significant change. Make a detailed analysis and appraisal of the present offerings, including the texts used and the adequacy and currency of course descriptions. Refer to data presented in Section VII - Course Outlines.

The Mechanical Engineering Technology program has been in existence since Fall 1970. The organization of the core technical course offerings has changed little over the years. As deemed necessary, instructional topics have been updated. The areas of change have included the following:

(1) Mechanical Laboratory Courses

The MET program has had two primary educational directions: design and experimental testing. The experimental courses form a two-semester sequence, MECH 211 Fluid Mechanics and MECH 221 Mechanical Measurements with Computer Applications. This arrangement has existed from the beginning of the program.

Changes in these courses of instruction have revolved around acquisition of equipment. The experimental units have always been adopted to feature any newly available apparatus.[5]

One effect of the availability of powerful computational tools is a new emphasis on statistical calculations. Not long ago it was too expensive and time consuming. A "least squares fit" was accomplished with a transparent straight edge on a hand drawn graph. Now the students use electronic spreadsheets to graph the data and to calculate statistical quantities.

Also, we have to recognize that measurements are samples of an indefinite population. This leads us to the t-distribution and the associated computations.

In recent years the laboratories have received support from the Electrical/Electronics department. This has included assistance from their technician as well as faculty and equipment resources. This has aided our efforts in moving toward computerized data acquisition.

5 An inventory of MET laboratory equipment and supplies is presented in Appendix E.

VI.B. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

(2) Design Courses

The design-oriented courses in the MET program include ETEC 140 Engineering Drawing and CAD, MECH 240 Statics and Strength of Materials, MECH 212 Kinematics of Mechanisms, and MECH 222 Machine Design. Historically, there was greater emphasis on manual drafting skills. There has been a significant shift to the use of CAD systems.

In the second year of the program the design courses have undergone little change in topic coverage over the years. What has changed are the methods of computation and graphing. Calculators and electronic spreadsheets have replaced the slide rule.

(3) Mathematics

1970 - 1982: Terminal math course was precalculus (Advanced algebra & Analytic Trigonometry)

1983 - 1987: Within the program a two-course sequence in technical precalculus and technical calculus was developed. At that time the Math department did not offer any technical mathematics courses.

1988 - 1992: The program adopts the new technical math offerings of the Math department, including one quarter of technical calculus.

1993 - 1995: In semester conversion a number of courses, including technical calculus, are increased from four quarter credits to four semester credits. Also, the University now caps the full-fee semester credit hours at sixteen. As a result of the credit-hour squeeze, the technical calculus course is dropped.

1996: The technical mathematics course MATH 216 (4 credits) was restored to the program. Attempts to independently introduce applied calculus topics in some of the second year courses were not seen as being a success.

(4) Physics

1970 - 1992: The program contained a two-quarter sequence in physics (a total of eight quarter credits).

1993 - 1995: In semester conversion one physics course PHYS 211 (four semester credits) was adopted. Coverage of the topics in electricity and magnetism that appear in the second physics course was included, in part, in the electrical sequence, EEET 215 and EEET 225.

1996: The second physics course PHYS 212 was adopted. To make room, the electrical sequence was reduced from two courses, EEET 215 and EEET 225 (eight credits), to one course, EEET 215 (four credits).

C. Physical facilities

Describe the classroom and laboratory facilities including major items of equipment. To what extent are the facilities utilized? Discuss what extent laboratory facilities are used in support of physics, chemistry, and other basic science courses as well as core courses in the program. Discuss any important equipment deficiencies and explain what procurement action has been initiated or is projected to remedy

VI.C. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

such deficiencies. Appraise the existing facilities with respect to their adequacy to accommodate present enrollments. If enrollments increase, will expansion be required? What provision has been made for any such expansion? Discuss procedures for equipment replacement and maintenance. Since the last TAC of ABET visitation, or five years if initial accreditation, list and describe specific additions in laboratory equipment and the cost of this additional equipment by year. Also, discuss any changes in laboratory space and the effect on program quality.

The MET program laboratories occupy two adjoining rooms on the third floor of the five-story Swan Technical Building. Classrooms for lectures are located in the same hallway and are shared with other programs in the College of Technology. There are no longer facilities in the laboratories that would allow them to be used also as lecture rooms. This change took place in 1988 when the building was re-furbished. Faculty offices were moved to Johnson Hall, a remodeled former dormitory. This allowed a significant gain in space for equipment used in experiments. Also, storage space was increased.

These laboratory facilities are used exclusively for courses offered by the MET program.

The Mechanical Engineering Technology (MET) Laboratory Areas and the Courses They Support

FLUID MECHANICS AND FLUID POWER LABORATORY - Room 303 Swan Building

Capacity = 16 students

MECH 211 Fluid Mechanics	3 hours lecture, 3 lab, 4 credits Offered each Fall Semester, primarily for MET students Usually, 1 lecture section and 2 lab sections
MECH 250 Fluid Power with Controls	1 hour lecture, 2 lab, 2 credits Offered each Winter Semester, primarily for Plastics Technology students. Usually, 2 lecture sections and 4 lab sections

MECHANICAL MEASUREMENTS LABORATORY - Room 302 Swan Building

Capacity = 12 students

MECH 221 Mechanical Measurements with Computer Applications
3 hours lecture, 3 lab, 4 credits
Offered each Winter Semester, primarily for MET students
Usually, 1 lecture section and 2 lab sections

VI.C. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

Major Items of Equipment in the MET Laboratories

EQUIPMENT SUMMARY - FLUID MECHANICS AND FLUID POWER LABORATORY

Low speed teaching wind tunnel:	Pitot-static tube, slant manometers Air foil with 16 orifices for static pressure measurement Golf ball drag apparatus Drag force balance apparatus
Fluid mechanics bench:	Venturi meter, Pipe flow friction apparatus Flow through an orifice apparatus, Jet impact apparatus
Dead weight pressure tester with Bourdon tube pressure gages	
Pneumatic fluid power benches:	Quick-disconnect hoses, filters, regulators, and manifold Valves, cylinders, and motors
Fluidics bench:	Filter, regulator, manifold, valves, and tubing Air cylinder, fluidic indicators, AND/NAND, OR/NOR, and FLIP-FLOP logic gates Fluidic capacitors and amplifiers
Electro-hydraulic bench:	Reservoir, pump, pressure relief valve, power supply Quick disconnect hoses, valves, cylinders, and motors Limit switches, pressure switches, timer Solenoid operated valves

V.C. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

EQUIPMENT SUMMARY - MECHANICAL MEASUREMENTS LABORATORY

Length measurement:	Meter sticks, micrometer calipers Access to height gage and set of gage blocks
Area measurement:	Planimeters
Mass measurement:	Mass balance, set of standard masses,
Mass-moment of inertia measurement:	Torsional pendulum
Strain measurement:	Strain gage application stations Tools and supplies Instructional videotape Soldering stations with accessories Strain gage installation circuit checker Wheatstone bridge circuit boxes Digital strain indicators
Pressure measurement:	Pressure transducers
Temperature measurement:	Thermocouples
Dynamic data acquisition systems:	8 bit system Starbuck 8 bit analog-digital converters RS-232 port 486 50 MHz digital computer 16 bit system Micro-Measurements analog signal acquisition system Micro-Measurements 16 bit analog-digital converter 16 bit GPIB bus and circuit board

The Electrical/Electronics programs are located one story up on the fourth floor. They have a maintenance/repair area staffed with a technician. From time to time their technician supports installation, maintenance, and repair activities in the MET labs. The Electrical/Electronics department has been generous in providing, on occasion, access to equipment such as leads, power supplies, digital voltmeters, and amplifier breadboards and components.

The MET labs have sufficient capacity to support current enrollments. Currently, by regularly offering two lab sections the student capacity for MECH 211 Fluid Mechanics is 32 students and for MECH 221 Mechanical Measurements with Computer Applications is 24 students. If there were to be an increase in second year enrollment beyond this level it would require additional lab sections for each course. This would strain program faculty resources in terms of teaching loads.

V.C. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

Recent Equipment Additions for the MET Laboratories

Year	Items Acquired	Cost $
1991-2	2 486/50 MHz digital computers	4 800
	2 Omega amplifier and data acquisition systems	2 000
1992-3		
1993-4	16 bit high speed data acquisition system and accessories	14 700
	Micro-Measurements System 2100 analog data acquisition system	
	Micro-Measurements 16 bit analog-digital converter	
	GPIB bus and circuit board	
	Micro-Measurements strain gage installation circuit checker	
	Micro-Measurements P-3500 digital strain Indicator	
	Micro-Measurements strain indicator calibrator	
	Micro-Measurements B-500 Wheatstone bridge circuit box	
	Strain gage installation tools	
	ALGOR Finite Element Analysis software (donated)	0
1994-5		
1995-6	Rotating Beam Fatigue Machine (donated)	0
	Total $	21 500

In the last five years there has been no change in laboratory space.

VI. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

D. Computer facilities and equipment

Describe the computer facilities available for instructional use in the engineering technology program including the quantities and types of computers used and the types of software used. Explain how computers and software are maintained and upgraded.

The computer facilities available to mechanical engineering technology students include the computer laboratories, network and software of the College of Technology.[1]

The mechanical measurements lab has a 486/DX2 50 MHz computer. It is linked to the College of Technology network and accesses software including word processors, spreadsheets, CAD systems and programming languages. It also supports 8-bit and 16-bit high speed data acquisition.

E. Enrollment trends and retention

Trace the five year enrollment history for this program, offering explanations for any pronounced or significant changes in the established pattern. Discuss programs in effect to aid student retention. Indicate percentages for the first semester attrition and overall start-to-finish attrition.

The enrollment and retention history since Fall 1992 is shown in the following table.

MET Program Enrollment and Retention Data[2]

Class	Semester:	1	2	3	4	Grads
	Course:	MECH 111	MECH 122	MECH 211	MECH 221	
92 - 94	Total:	36				
	Pre-Tech:	3				
	2nd Year:	1				
	Net from 1st Year:	32	26	22	18	13
	% Retention (index):	**100**	**81**	**69**	**56**	**41**
93 - 95	Total:	27	29			
	Pre-Tech:	2	0			
	2nd Year:	0	4			
	Net from 1st Year:	25	25	21	14	8
	% Retention (index):	**100**	**100**	**84**	**56**	**32**
94 - 96	Total:	29				
	Pre-Tech:	5				
	Net from 1st Year:	24	22	22	19	19
	% Retention (index):	**100**	**88**	**88**	**76**	**76**
95 - 97	Total:	34				
	Pre-Tech:	5				
	2nd Year:	3				
	Net from 1st Year:	26	23			
	% Retention (index):	**100**	**92**			

[1] The computer facilities of the College of Technology are described in Appendix F.
[2] The data represents student enrollment in key MET courses each semester.

VI.E. **OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM** (continued)

For the 1992 - 1996 time period the average semester-to-semester enrollment and retention values are shown below.

MET Program Average Enrollment and Retention Rate 1992 - 1996

Semester:	1	2	3	4	Grads
Average Enrollment:	27	24	22	17	13
Average % Retention:	100	90	80	63	50

The retention rate compares favorably with that of the College of Technology and of the University. The fall off in retention from the fourth semester capstone course (MECH 221) to graduation is surprising. One cause is a change in admission policy by the third and fourth year laddering programs (B.S. in Manufacturing Engineering Technology, B.S. in Product Design Engineering Technology, B.S. Plastics Engineering Technology). They no longer require completion of the Associate's degree before admission. Apparently, some of the students feel no need to complete their MET Associate's degree in a timely manner.

We have instituted countermeasures to this phenomenon. We are surveying and tracking second year students more closely. We offer them encouragement and special assistance in completing their program. Sometimes it's a matter of their taking an English or Humanities course in Summer school.

At Ferris there are a number of programs in existence to help retention. Within the department there is active advising by each faculty. All students in the College of Technology must have an *Early Registration Clearance* form signed by their academic advisor before they can register for the next semester's courses. Many of our faculty hold open labs and special tutorial sessions to help those students who are having difficulty with their studies. MET program faculty recruit student tutors to run open labs and help other students on a regular basis. This effort is funded by Student Developmental Services.

Student Development Services offers a variety of services to students to help those who need support in coping with their college work load. These include tutoring, study skills materials, workshops, intensive English, handicapped services and a variety of reading skill approaches.

F. **Instruction**
Discuss the philosophy of instruction. Explain in detail any approaches that are considered unique or that have proven to be significantly effective or ineffective.

Instruction in the College of Technology and in the MET program has the following characteristics:

(1) The primary mission of the faculty is instruction. Ferris is not a research university.

(2) The MET program has a strong "hands on" approach to instruction. There are seven laboratory courses offered (six in the revised program beginning Fall 1996).

(3) Class size in the program is limited. The students have direct access to the regular full time faculty members. There are no teaching fellows and infrequent use is made of adjunct faculty.

VI. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

G. Library and communications

Describe how the library collection is used in specific technical courses by faculty and students. Describe the role of the engineering technology faculty in the selection of books and periodicals for the library. Describe how both oral and written communications are taken into account in the review and evaluation of student technical work.

In MECH 111 students are given an instructional tour of the library. They are shown where the technical selections are physically located, how to access the computer file system to find their selections and how to check their selection out of the library. The students are required to find certain reference selections and then write a brief synopsis on the particular topics. These assignments are intended to make the student more familiar with the library and how to find specific topics as well as how to supplement the text book information.

One of the faculty members in the program is on the library committee. This person works directly with the library in helping ensure proper selections for our programs. All faculty have the opportunity to review listings of all applicable references. The library also submits to the department listings of possible new references for all faculty to review and make recommendations. Recommended references are purchased by the library.

In the MET program laboratory courses a number of formal laboratory reports are required. In some cases there is a laboratory notebook. These student works are graded primarily for technical content but are also graded to some extent for correct grammar and syntax.

In the capstone course, MECH 221 Mechanical Measurements with Computer Applications, the students are required to give an oral report as well as a written report on their term project.

H. Faculty

Faculty are a key component for the educational and employment success of students. Discuss the strengths and limitations of the faculty as a whole. Consider such factors as academic credentials, industrial experience, teaching effectiveness, currency, scholarship and involvement in student activities. The morale of the faculty is also important -- are there serious issues related to turnover, promotion and tenure, communication with administration, salary, workload, and impending retirements? Discuss the changes in the faculty size since the last ABET visitation or five years if initial accreditation [retirements, terminations, resignations, new hires].

Many engineering technology programs use part-time or adjunct faculty. How are these faculty members selected, supervised and compensated? What ratio of courses are taught by these faculty members? Does the institution feel that this ratio is appropriate?

The MET program faculty are well qualified to meet the educational challenge that the program offers. All have considerable practical work experience in a variety of engineering fields.

In the last five years there have been two retirements and one tenure track addition. Part of the teaching load is now being shared by faculty from the Product Design Engineering Technology and the Electrical/Electronics Engineering Technology programs. Overall, the MET faculty group has been very stable. In the last decade the only departures have been retirees.

Little use is made of adjunct faculty in the MET program. This is due in part to the fact that there are very few potential candidates in the mostly rural Big Rapids area. The negative aspect is the lack of flexibility in teaching assignments it entails.

VI. OBJECTIVES AND SELF APPRAISAL OF THE PROGRAM (continued)

I. Strengths and weaknesses

List what are considered the significant strengths and limitations of this program. With each limitation, list any contemplated correction action. Describe present long-range plans as they relate to this particular program. Discuss factors relating to enrollment trends, employment outlook, any projected revision of objectives, curriculum changes, and anticipated physical facility changes.

A decade ago the program completed a self-study as part of a North Central Association (NCA) evaluation.[3] The major improvements achieved since that time are due to a major remodeling of the Swan Technical Building and the transfer of faculty offices to Johnson Hall.

The strengths of the program are:

(1) The faculty

(2) The students

(3) Well balanced curriculum to meet the technological challenges in the 21st century

(4) Demand for graduates from this program

(5) Well equipped laboratories

(6) Service to other programs in the College of Technology

(7) A reputation of excellence, developed over a twenty-five year period, that continues to attract students to our program and employers to our graduates.

The limitations of the program are:

(1) Funding in recent years has been more restrictive than in the past. There is developing a back log of equipment that is in need of repair or replacement. Substantial equipment replacement and repair funds have been requested for the 1996 - 1997 fiscal year.

(2) Associate degree programs at Ferris face competition from community colleges across the State. To survive in this kind of educational environment it is necessary to maintain a program of continuous improvement.

(3) In industry there is a trend towards hiring four-year graduates. Our students cope with this by laddering into B.S. degree programs.

The most recent program curricula changes are detailed in Appendices A and B. These modifications will bring the program into full compliance with ABET criteria and requirements.

No significant changes in physical facilities are anticipated in the near future.

3 This self-study is included in Appendix H.

VII. COURSE OUTLINES

For each required technical science, technical specialty and technical elective course credited toward meeting degree requirements, provide a course outline. The institution may use existing course outlines in any format which includes the information below. If existing course outline do not have certain information, attach an addendum to the course outline. It is not necessary that all course outlines follow the same format.

Course Outline Information

Title and Course Number

Credits and Contact Hours (Lecture/Laboratory)

Course Description

Prerequisites and Co-Requisites

Textbook

References

Course Coordinator [if assigned]

Goals/Objectives

Course topics and lecture hours devoted to each topic

Computer usage [be specific]

Laboratory projects [including major items of equipment and instrumentation used]

Oral and written communication requirements [be specific]

Calculus usage [be specific]

Library usage [be specific]

Prepared by ____________________________ Date ______________

Note: The institution should review section III.B.1.c.9. of the ABET criteria. Course outlines and textbooks must be available to the visitation team for all courses required for graduation. For technical, mathematics and science courses there must also be sufficient examples of student work, in addition to course outlines and textbooks, available to the visitation team.

COURSE OUTLINE - MECH 111

Appr. ________
Date: 12-12-91

COURSE TITLE: MECH 111 MET Seminar

COURSE DESCRIPTION: An introduction to the Mechanical Engineering Technology program. The student is introduced to the MET faculty, to the procedures for scheduling, and to the program requirements. Careers in engineering and technology are reviewed and the excitement and challenge of engineering design and experimental testing are also explored.

CREDIT HOURS: One Semester Hour

CONTACT HOURS: Lecture - 1 Hour/Week
Lab - 0 Hour/Week

PREREQUISITE: MET Technical Standing

TEXTBOOKS REQUIRED: Introduction to Engineering Technology, by R. J. Pond. Prentice Hall, 3rd Edition, 1996.

OTHER MATERIALS: Programmable scientific calculator (TI-85 or equivalent)
Computer disks, 3-ring notebook

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Allocations Lecture	Lab
I. Introduction	1	0
A. Know the course goals, the attendance policy, and the grading policy		
B. Be familiar with the MET program, meet the faculty and learn the office locations		
C. Understand what an engineering technologist is.		
II. Engineering and Technology	2	0
A. Understand the makeup of the technological team		
B. Be familiar with the areas covered by the career fields in engineering and technology		
C. Comprehend the professional responsibilities of engineers and technicians		
D. Understand the role of women in engineering and technology.		
III. Developing Study Habits	2	0
A. See the need for good study habits		
B. Understand what good study habits are and how to prepare for exams		
C. Understand the need for time management.		
IV. Spoken and Written Communication	2	0
A. Understand the elements of spoken and written communication		

COURSE OUTLINE - MECH 111 (continued)

		Hours	
	B. Comprehend the importance of communication skills for the engineering technologist		
	C. Prepare a resume		
	D. Perform an electronic search for course-related information.		
V.	Engineering Design	3	0
	A. Understand the role of modeling in engineering design		
	B. Understand some of nature's designs that are of interest in engineering		
	C. Understand the design process and the phases of design		
	D. Complete a project of limited scope.		
VI.	Introduction to Engineering Analyses	2	0
	A. Be familiar with the use of statistics in engineering		
	B. Be able to compute arithmetic mean, median, and mode		
	C. Be familiar with interest calculations in engineering economy.		
VII.	Computers	3	0
	A. Become familiar with types of computers and fundamental computer terms		
	B. Write and execute elementary programs in BASIC		
	C. Program a scientific calculator to accomplish repetitive calculations.		
VIII.	Evaluation	2	0
	A. Demonstrate an understanding of course objectives.		
	TOTAL	17	0

TOPICAL OUTLINE:

I. Introduction
- A. Course syllabus, course goals, attendance policy, grading policy
- B. MET program
  1. MET program course requirements
  2. Faculty, advisors, offices
  3. Scheduling procedures
- C. Engineering technology programs
  1. Technical calculus mathematics
  2. Transferability.

II. Engineering and Technology
- A. The technological team
  1. Scientist
  2. Engineer
  3. Engineering technologist
  4. Technician
  5. Craftsman
- B. Career fields
  1. Engineering areas such as aerospace, automotive, chemical, electrical, industrial, mechanical, nuclear, etc.

COURSE OUTLINE - MECH 111 (continued)

- C. Engineering function
  - 1. Research, development, design, production, operations, sales and management
- D. Professional responsibilities
  - 1. Registration
  - 2. Certification
  - 3. Professional societies.

III. Developing Study Habits
- A. The student environment
- B. Studying to learn
- C. Preparing for exams
- D. Time Management.

IV. Spoken and Written Communication
- A. Verbal communication
- B. Graphic communication
- C. Mathematical communications
- D. Technical reporting
  - 1. Written reports
  - 2. Oral reports
- E. Resume
- F. Electronic search.

V. Engineering Design
- A. Engineering modeling
- B. Nature's designs
- C. The design process
  - 1. Define the problem
  - 2. Gather data
  - 3. Create ideas
  - 4. Prepare a model
  - 5. Analyze and evaluate
  - 6. Experiment
  - 7. Present solution
- D. Design phases
  - 1. Feasibility study
  - 2. Detailed design.

VI. Engineering Analysis
- A. Statistics
  - 1. Mean, median, mode
  - 2. Probability
- B. Engineering economy
  - 1. Interest calculations
  - 2. Present worth, future worth.

VII. Computers
- A. Computer types and terminology
- B. BASIC programming
- C. Programmable calculators.

COURSE OUTLINE - MECH 111 (continued)

VIII. Evaluation
    A. Final Exam.

MINIMUM REQUIRED STUDENT LAB ACTIVITIES DEFINED:

None.

CALCULUS USAGE

None.

ORAL AND WRITTEN COMMUNICATIONS REQUIREMENTS

Project competition and report.

COMPUTER USAGE

1. Introduction to the College of Technology computer facilities and network
2. Exposure to word processing, electronic spreadsheets and BASIC programming.

COURSE OUTLINE - MECH 122

Appr:_____
Date: 12-12-91

COURSE TITLE: MECH 122 Computer Applications in Technology

COURSE DESCRIPTION: An introduction to the computer facilities, design and testing oriented software, and programming tools available to students in the Mechanical Engineering Technology program. Emphasis is placed on computation and graphing with electronic spreadsheets and on computer programming in BASIC for curve plotting and communications port/data acquisition applications.

CREDIT HOURS: Two Semester Hours

CONTACT HOURS: Lecture - 2 Hours/Week
Lab - 0 Hours/Week

PREREQUISITES: MATH 116, ETEC 140, MATH 126 (co-requisite)

TEXTBOOK REQUIRED: Microsoft Quickbasic: Introduction to Structured Programming, by Schneider. MacMillan Publishing Company.
Quattro Pro User's Guide. Borland, 1990.

OTHER MATERIALS: Texas Instrument TI-85 calculator or equivalent
Computer memory Disks (2), Engineering paper

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:		Time Allocations Lecture	Lab
I.	Introduction	1	0
	A. Be introduced to the course goals, grading and attendance policy		
	B. Be familiarized with the departmental computer facilities.		
II.	Survey of Computer Applications	3	0
	A. Understand the utility and convenience of a word processing program		
	B. Comprehend the format and power of electronic spreadsheets		
	C. Understand the possibilities of computer programming languages.		
III.	Electronic Spreadsheet Applications	12	0
	A. Understand data entry, cell relations, and formula building		
	B. Acquire access to standard math functions		
	C. Comprehend charting and graphing		
	D. Understand spreadsheet output to a printer or plotter		
	E. Accomplish applications from applied mathematics and engineering technology.		
IV.	Basic Programming Language	12	0
	A. Understand the features of BASIC and the different types of variables		

COURSE OUTLINE - MECH 122 (continued)

B. Comprehend input-output routines and file handling
C. Utilize logic operators and program loop commands
D. Acquire a knowledge of structured programming
E. Prepare graphs.

V.	Testing and Evaluation.	4	0
	TOTAL	32	0

TOPICAL OUTLINE:

I. Introduction
  A. Course syllabus, goals, attendance policy, grading policy
  B. Tour the departmental computer facilities
    1. Microcomputer labs
    2. MET Data Acquisition lab
  C. Describe and demonstrate what can be accomplished with these systems.

II. Survey of Computer Applications
  A. Word processing
    1. Word Perfect
    2. Microsoft Word
  B. Electronic Spreadsheets.

III. Word Processing
  A. Keyboard entry
  B. Editing
  C. Files
  D. Printing
  E. Desktop publishing.

IV. Electronic Spreadsheet Applications
  A. Data entry
  B. Cell relations and formula building
  C. Available functions
  D. Charting and graphing
  E. Output to a printer
  F. Output to a plotter
  G. Applications in applied math and engineering technology
  H. Macros.

V. Programming in BASIC
  A. Features of BASIC
  B. Variable types
    1. Fixed point
    2. Floating point
    3. Arrays
    4. Strings
  C. Input - Output
  D. File handling
  E. Logic operators

COURSE OUTLINE - MECH 122 (continued)

F. Iteration loops.

VI. BASIC Programming Applications
A. Computation
B. Graphing
C. Communication port/data acquisition.

VII. Testing and Evaluation
A. Quizzes
B. Programming assignments
C. Exams.

MINIMUM STUDENT LAB ACTIVITIES:

None.

CALCULUS USAGE

None.

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

Presentation of programming project.

COMPUTER USAGE

1. Word processing
2. Calculation and graphing with electronic spreadsheets
3. Programming in BASIC with applications in computation, graphing and file manipulation.

COURSE OUTLINE - MECH 211

Appr:______
Date: 12/13/91

COURSE TITLE: MECH 211 Fluid Mechanics

COURSE DESCRIPTION: This course presents the principles of fluid statics, flow in closed and open channels, fluid flow measurement, and low-speed aerodynamics. The laboratory activity covers experimental confirmations of the theory as well as demonstrations of the operation of pneumatic and hydraulic fluid power components, circuits and control systems.

CREDIT HOURS: Four Semester Hours

CONTACT HOURS: Lecture - 3 Hours/Week
Lab - 3 Hours/Week

PREREQUISITES: MATH 126, MECH 240 (Co-requisite).

TEXTBOOK REQUIRED: Applied Fluid Mechanics, by R. L. Mott. Merrill Publishing Company, 4th Edition, 1992.

OTHER MATERIALS: Texas Instrument TI-85 Calculator or equivalent
Computer Memory Disks (2), Science Laboratory Notebook
Fluid power template, Engineering paper.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Allocations Lecture	Lab
I. Introduction	1	0
A. Be introduced to the course goals		
B. Understand the grading and attendance policy		
C. Review units of measure (SI, cgs and US customary systems).		
II. Basic Fluid Properties	1	3
A. Newtonian and Non-Newtonian		
B. Measure specific gravity		
C. Measure viscosity with a capillary-tube viscometer and a Saybolt viscometer.		
III. Fluid Pressure and its Measurement	2	4
A. Calibrate a pressure gauge with a dead-weight pressure tester		
B. Measure atmospheric pressure with a barometer		
C. Construct a water barometer.		
IV. Forces and Moments on Submerged Surfaces	2	0
A. Calculate forces and moments on submerged plane areas		
B. Calculate forces and moments on submerged curved surfaces.		
V. Pneumatic Fluid Power	1	5
A. Assemble, operate, and prepare a fluid power schematic for a pneumatic bench		

COURSE OUTLINE - MECH 211 (continued)

	B. Prepare a fluid power schematic of an air compressor system		
	C. Assemble, operate and prepare fluid power schematics for pneumatic valve, cylinder and motor circuits		
	D. Assemble, operate and prepare fluid power schematics for a pneumatic circuit with automatic return		
	E. Assemble, operate and prepare fluid power schematics for a pneumatic circuit with automatic reciprocation.		
VI.	Buoyancy and Stability	3	2
	A. Calculate and test the buoyancy and stability of floating and submerged bodies.		
VII.	Hydraulic Fluid Power	1	5
	A. Assemble, operate, and prepare a fluid power schematic for a hydraulic bench		
	B. Assemble, operate and prepare fluid power schematics for hydraulic valve, cylinder and motor circuits		
	C. Assemble, operate and prepare fluid power schematics for a hydraulic cylinder sequence valve circuit		
	D. Assemble, operate and prepare fluid power schematics for a hydraulic cylinder circuit with an accumulator		
	E. Assemble, operate and prepare fluid power and electric schematics for a hydraulic cylinder circuit with control relays.		
VIII.	Bernoulli Equation	2	0
	A. Calculate fluid flow in pipes with the Bernoulli equation.		
IX.	General Energy Equation	2	0
	A. Calculate fluid flow in pipes with the general energy equation.		
X.	Laminar and Turbulent Flows	2	3
	A. Investigate laminar and turbulent flows and the velocity profile for laminar flow		
	B. Measure pipe friction for laminar and turbulent flows.		
XI.	Energy Losses Due to Friction	2	0
	A. Introduce Moody's diagram for friction factor and calculate and measure energy losses due to fluid friction for laminar and turbulent flows		
	B. Calculate energy losses in flow system components.		
XII.	Electro-Hydraulics	1	5
	A. Assemble, operate and prepare fluid power and electric schematics for a hydraulic cylinder circuit with control relays		
	B. Assemble, operate and prepare fluid power and electric schematics for a hydraulic cylinder circuit with limit switches.		
	C. Assemble, operate and prepare fluid power and electric schematics for a hydraulic cylinder circuit with pressure switches.		

COURSE OUTLINE - MECH 211 (continued)

XIII.	Minor Losses	2	0
	A. Analyze friction losses in pipe elements.		
XIV.	Series Pipe Systems	2	0
	A. Analyze series pipe systems.		
XV.	Parallel Pipe Systems	2	0
	A. Analyze parallel pipe systems		
	B. Apply the Hardy-Cross method for solving pipe systems with three or more branches.		
XVI.	Fluidic Logic	2	6
	A. Assemble, operate and prepare schematics for OR/NOR, AND/NAND and FLIP-FLOP fluidic logic gates.		
	B. Assemble, operate and prepare schematics for a fluidic multi-vibrator circuit and for a logic identity that replaces an AND gate by three NOR gates		
	C. Assemble, operate and prepare schematics for control of an air cylinder with fluidic logic gates.		
	D. Assemble, operate and prepare schematics for a fluid power level sensor using a Schmitt trigger.		
XVII.	Open Channel Flow	3	0
	A. Calculate flows in open channels		
	B. Consider circular and non-circular cross-sections		
	C. Analyze tranquil and rapid flows and hydraulic jumps.		
XVIII.	Flow Measurement	3	6
	A. Study flow measurement, including variable-head meters, variable area meters, turbine flowmeters, vortex flowmeters, and magnetic flowmeters		
	B. Measure the pressure distribution through a venturi flowmeter		
	C. Measure the loss coefficients for a variety of flowmeter orifices.		
XIX.	Pump Performance	3	0
	A. Examine pump performance and selection in fluid transport applications.		
XX.	Forces due to Fluids in Motion	2	3
	A. Analyze forces due to fluid motion		
	B. Measure the force of jet impact on flat and curved surfaces.		
XXI.	Drag and Lift	2	3
	A. Study lift and drag forces on aerodynamic shapes.		
XXII.	Testing and Evaluation.	6	0
	TOTAL	47	45

COURSE OUTLINE - MECH 211 (continued)

TOPICAL OUTLINE:

I. Introduction and Orientation
   A. Course goals
   B. Grading and attendance policy
   C. Systems of units of measure.

II. Basic Fluid Properties
   A. Specific gravity
   B. Viscosity.

III. Fluid Pressure and Its Measurement
   A. Calibrate a pressure gauge
   B. Measure atmospheric pressure with a barometer.

IV. Forces and Moments on Submerged Surfaces
   A. Forces and moments on submerged plane areas
   B. Forces and moments on submerged curved surfaces.

V. Pneumatic Fluid Power
   A. Air compressor system
   B. Pneumatic work station
   C. Pneumatic valve, cylinder and motor circuits
   D. Air cylinder with automatic return
   E. Automated air cylinder.

VI. Buoyancy and Stability
   A. Buoyancy and stability of submerged bodies
   B. Buoyancy and stability of floating bodies.

VII. Hydraulic Fluid power
   A. Hydraulic bench
   B. Hydraulic valve, cylinder and motor circuits
   C. Hydraulic cylinder sequence valve circuit
   D. Hydraulic cylinder circuit with an accumulator.

VIII. Bernoulli Equation
   A. Fluid flow in pipes
   B. Toricelli's theorem
   C. The siphon.

IX. General Energy Equation
   A. Flow in pipes with pumps, motors and fluid friction.

X. Laminar and Turbulent Flows
   A. Nature of laminar and turbulent flows
   B. Velocity profile for laminar flow.

XI. Energy Losses Due to Friction
   A. Moody's diagram for friction factor
   B. Energy losses due to fluid friction for laminar and turbulent flows

COURSE OUTLINE - MECH 211 (continued)

C. Empirical equations for friction factor.

XII. Electro-Hydraulics
A. Hydraulic cylinder circuit with control relays
B. Hydraulic cylinder circuit with limit switches
C. Hydraulic cylinder circuit with pressure switches
D. Hydraulic cylinder and motor circuit with timer.

XIII. Minor Losses
A. Energy losses in flow system components
B. Loss coefficients for a variety of flowmeter orifices.

XIV. Series Pipe Systems
A. System classification
B. Type I systems (pressure change unknown)
C. Type II systems (flow rate unknown)
D. Type III systems (pipe diameter unknown).

XV. Parallel Pipe Systems
A. Systems with two branches
B. Systems with three or more branches
C. Hardy-Cross method.

XVI. Fluidic Logic
A. OR/NOR, AND/NAND and FLIP-FLOP fluidic logic gates
B. Air cylinder automated with fluidic logic gates
C. Logic identity that replaces an AND gate by three NOR gates
D. Fluid level sensor using a Schmitt trigger.

XVII. Open Channel Flow
A. Hydraulic radius
B. Circular and non-circular cross-sections
C. Tranquil and rapid flows
D. Hydraulic jump.

XVIII. Flow Measurement
A. Variable head meters
B. Variable area meters
C. Turbine flowmeters
D. Vortex flowmeters
E. Magnetic flowmeters
F. Orifice coefficients.

XIX. Pump Performance
A. Types of pumps
B. Positive displacement pumps
C. Centrifugal pumps
D. Net positive suction head.

XX. Forces Due to Fluids in Motion
A. Impulse-momentum equation

COURSE OUTLINE - MECH 211 (continued)

B. Forces on stationary objects.
C. Forces on moving objects
D. Jet propulsion
E. Rocket propulsion.

XXI. Drag and Lift
A. Friction drag force
B. Pressure drag
C. Drag coefficient
D. Drag on spheres in laminar and turbulent flow
E. Vehicle drag.

XXII. Exams

MINIMUM STUDENT LAB ACTIVITIES:

A. Fluid Properties
1. Measure specific gravity
2. Measure viscosity

B. Pressure Measurement
3. Calibrate a pressure gauge
4. Measure atmospheric pressure

C. Pneumatic Fluid Power
5. Assemble and operate a pneumatic valve, cylinder and motor circuit
6. Assemble and operate a pneumatic cylinder circuit with automatic return
7. Assemble and operate a pneumatic cylinder circuit with automatic reciprocation

D. Hydraulic Fluid Power
8. Assemble and operate a hydraulic valve, cylinder and motor circuit
9. Assemble and operate a hydraulic cylinder sequence valve circuit
10. Assemble and operate a hydraulic cylinder circuit with an accumulator

E. Electro-Hydraulic Fluid Power
11. Assemble and operate a hydraulic cylinder circuit with control relays
12. Assemble and operate a hydraulic cylinder circuit with limit switches
13. Assemble and operate a hydraulic cylinder circuit with pressure switches
14. Assemble and operate OR/NOR, AND/NAND and FLIP-FLOP fluidic logic gates
15. Assemble and operate an air cylinder automated with fluidic logic gates
16. Assemble and operate a fluid level sensor using a Schmitt trigger

F. Flow Measurement
17. Measure the pressure distribution and orifice coefficient for a venturi flowmeter
18. Measure the friction factor for laminar and turbulent pipe flows
19. Measure the flow coefficient for an orifice flowmeter
20. Measure the force due to jet impact on a solid surface
21. Measure the aerodynamic drag force on a blunt body
22. Measure the pressure distribution on an airfoil.

COURSE OUTLINE - MECH 211 (continued)

CALCULUS USAGE

1. Calculation of drain time for gravity flow of liquid out of a container through an orifice
2. Development of force calculations on submerged areas
3. Use of calculus in explaining impulse-momentum concepts.

ORAL AND WRITTEN COMMUNICATIONS REQUIREMENTS

1. Written laboratory reports
2. Brief presentation of a section of text in lecture.

COMPUTER USAGE

1. Electronic spreadsheets are used to reduce measurement data from laboratory experiments
2. A spreadsheet also is used to organize the iterative Hardy-Cross computation for flow of a liquid in a parallel pipe network.

COURSE OUTLINE - MECH 212

Appr:______
Date: 5-20-92

COURSE TITLE: MECH 212 Kinematics of Mechanisms

COURSE DESCRIPTION: This course is concerned with the study of the motion of mechanisms and devices (kinematics). Topics include displacement, instant centers, velocity and acceleration of components in a variety of mechanisms. A graphical approach allows a development of understanding that later facilitates a more analytical approach. Devices that allow the student to trace typical displacement curves are available.

CREDIT HOURS: Two Semester Hours

CONTACT HOURS: Lecture - 2 Hours/Week
Lab - 0 Hours/Week

PREREQUISITES: MATH 126, MATH 216 (co-requisite)

TEXTBOOKS REQUIRED: Basic Graphical Kinematics, by H. B. Kepler. Glencoe Division - Macmillan/McGraw-Hill Publishing company, Second Edition, 1973.

WORKBOOK: Problems in Basic Graphical Kinematics, by H. B. Kepler. Glencoe Division - Macmillan/McGraw-Hill Publishing company, Second Edition, 1973.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Allocations Lecture	Lab
I. Introductory Considerations	3	0
A. Understand the course objectives and conduct of the class		
B. Understand kinematic definitions		
C. Be able to develop skeleton outline from machine representation.		
II. Linkages	4	0
A. Be familiar with types of motion characteristics: four bar linkage, slider crank, scotch-yoke, quick-return, pantographs, universal joints		
B. Understand the construction of point paths and analysis of mechanisms		
C. Be able to develop a displacement diagram of a mechanism.		
III. Instant Centers (centros)	4	0
A. Understand the concept of the instant center		
B. Be able to graph the locations of instant centers for a variety of four-bar and six-bar mechanisms.		
IV. Velocity and Acceleration Curves	4	0
A. Understand basic definitions and methods of obtaining velocities and accelerations of mechanisms		
B. Be able to determine displacement, velocity, and acceleration curves for various mechanisms.		
V. Velocity and Acceleration Analysis	4	0

COURSE OUTLINE - MECH 212 (continued)

A. Understand the relationship of linear and angular motions
B. Understand the methods of relative velocity instant centers, components and proportionalities
C. Be familiar with Coriolis acceleration affects
D. Be able to lay out mechanisms and determine velocities of any point using various methods.

VI.	Cams	4	0
	A. Be familiar with the various types of cams and followers		
	B. Understand the definitions, motions and procedures used to design cams		
	C. Be able to determine motions of cams and to design cams to produce desired motions.		
VII.	Design of Mechanisms for Desired Motion	4	0
	A. Understand advantages and disadvantages of various motions and how to obtain them		
	B. Be able to design a mechanism with specified motions and requirements.		
VIII.	Exams	5	0
	A. Be able to demonstrate proficiency in materials covered.		
	Total	32	0

TOPICAL OUTLINE:

I. Introduction
   A. Course goals, syllabus, attendance policy, grading policy
   B. Kinematic definitions and skeleton machine representation.

II. Displacement
   A. Displacement motion of the four (4) bar mechanism, slider crank, scotch-yoke, quick-return, pantograph and other common devices
   B. Plot the point path of the above devices
   C. Develop the displacement diagrams for the above devices
   D. Graphical mathematics (slopes and stress).

III. Instant Centers (centros)
   A. Concept of the instant center
   B. Graphical location of instant centers for a variety of four-bar and six-bar mechanisms.

IV. Velocity and Acceleration Curves
   A. Curves retaliated to angular and linear velocities and acceleration
   B. Graphical calculus plot the displacement, velocity, and acceleration curves for common mechanisms.

V. Velocity and Acceleration Analysis
   A. Relationships of linear and angular motion
   B. Solutions for velocities using instant centers, relative velocities, components and proportionality
   C. Graphical solution to acceleration including Coriolis accelerations.

COURSE OUTLINE - MECH 212 (continued)

VI. Cams
- A. Introduce cam motion and plot various motions such as constant velocity, constant acceleration, cycloidal, simple harmonic
- B. Design motion diagrams
- C. Cam design.

MINIMUM REQUIRED LABORATORY ACTIVITIES:

None.

CALCULUS USAGE

1. Displacement-velocity-acceleration relationships.

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

1. Documentation for a design project.

COMPUTER USAGE

1. Use of electronic spreadsheets to calculate and prepare graphs of motion parameters for kinematic mechanisms.
2. Visualization of mechanism motion with computer software.

Mechanical Engineering Technology

Accreditation Report

1996-1997

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COURSE OUTLINE - MECH 221

Appr:______
Date: 12/13/91

COURSE TITLE: MECH 221 Mechanical Measurement with Computer Applications

COURSE DESCRIPTION: Introduction to methods of instrumentation, collection, and analysis of data. The emphasis will be on methods of measurement for mechanical quantities such as temperature, pressure, area, stress, strain, force and torque. This includes computer data acquisition to obtain, analyze, and plot the data.

CREDIT HOURS: Four Semester Hours

CONTACT HOURS: Lecture - 3 Hours/Week
Lab - 3 Hours/Week

PREREQUISITES: MECH 221, MECH 240, EEET 215 (co-requisite)

TEXTBOOK REQUIRED: Mechanical Measurements, by T. G. Beckwith, R. D. Marangoni and J. M. Lienhard. Addison-Wesley Publishing Company, Fifth Edition, 1993.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:		Time Allocations Lecture	Lab
I.	Introduction	2	0
	A. Understand the course objectives		
	B. Comprehend planning for experiments		
	C. Prepare the laboratory notebook		
	D.. Be ready to perform experiments.		
II.	The Process of Measurement	3	3
	A. Grasp the fundamental methods of measurement		
	B. Understand generalized measuring systems		
	C. Comprehend measurement standards		
	D. Understand the need for calibration.		
III.	Standards and Dimensional Units of Measurement	3	3
	A. Understand the establishment of dimensional standards		
	B. Review measurement standards in the United States		
	C. Comprehend the SI system		
	D. Be able to convert between systems of units		
	I. Understand significant digits, rounding and truncation.		
IV.	Assessing and Presenting Experimental data	3	3
	A. Be able to identify common types of error		
	B. Understand uncertainty in measurement		
	C. Be able to estimate precision uncertainty		
	D. Comprehend the theory based on the population		
	E. Comprehend the theory based on the sample		
	F. Understand measures of goodness of fit		
	G. Comprehend bias and single sample uncertainty		
	H. Understand factors in minimizing error in designing experiments		
	I. Be able to graphical present data		
	J. Accomplish curve fitting and apply the method of least squares.		

COURSE OUTLINE - MECH 221 (continued)

		Lecture	Lab
V.	Sensors	3	3
	A. Be able to classify first-stage devices		
	B. Understand sliding contact devices		
	C. Be introduced to the resistance strain gage		
	D. Understand thermistors and thermocouples.		
VI.	Signal Conditioning	3	3
	A. Understand the advantages of electrical signal conditioning		
	B. Be able to analyze voltage dividing circuits		
	C. Be able to use resistance bridges		
	D. Understand operational amplifiers.		
VII.	Digital Techniques in Mechanical Measurement	3	3
	A. Understand the digitizing of mechanical inputs		
	B. Be introduced to the fundamentals of digital circuit elements		
	C. Comprehend number systems		
	D. Use the digital computer as a measurements system tool		
	E. Employ analog to digital conversion.		
VIII.	Displacement and Dimensional Measurement	3	3
	A. Be able to use gage blocks		
	B. Understand effects of temperature		
	C. Be aware of surface roughness effects.		
IX.	Strain and Stress Measurement	3	6
	A. Perform strain measurement		
	B. Use electrical resistance strain gages		
	C. Employ strain gage bridge circuits		
	D. Accomplish temperature compensation		
	E. Achieve calibration		
	F. Use stress-strain relationships		
	G. Understand gage orientation		
X.	Measurement of Force and Torque	3	6
	A. Measuring methods		
	B. Mechanical weighing systems		
	C. Elastic transducers		
	D. Strain gage load cells		
	E. Torque measurement.		
XI.	Measurement of Pressure	3	3
	A. Static and dynamic pressures		
	B. Pressure measuring systems		
	C. Pressure measuring transducers		
	D. Elastic diaphragms		
	E. Strain gage pressure cells		
	F. Calibration methods.		
XII.	Measurement of Fluid Flow	3	3
	A. Obstruction meters		

COURSE OUTLINE - MECH 221 (continued)

		Lecture	Lab
	B. The variable-area meter		
	C. Measurement of fluid velocities		
	D. Pressure probes		
	E. Calibration of flow measuring devices.		
XIII.	Temperature Measurements	3	3
	A. Use of bi-materials		
	B. Thermocouples		
	C. Calibration of temperature measuring devices.		
XIV.	Measurement of Motion	3	3
	A. Vibrometers and accelerometers		
	B. Calibration		
	C. Vibration test methods.		
XV.	Evaluation	6	0
	A. Assignments and quizzes		
	B. Written reports		
	C. Project presentation		
	D. Exams and final exam.		
	TOTAL	47	45

TOPICAL OUTLINE:

I. Introduction
- A. Course objectives
- B. Planning for experiments
- C. The laboratory notebook
- D.. Performance of experiments
  - 1. Observations
  - 2.. Data sheets
  - 3. Laboratory precautions
- E. Data reduction and analysis
- F. Curve plotting.

II. The Process of Measurement
- A. Fundamental methods of measurement
  - 1. direct comparison
  - 2. using a calibrated system
- B. The generalized measuring system
  - 1. sensor-transducer stage
  - 2. signal conditioning stage
  - 3. terminating readout stage
- C. Measurement standards
- D. Calibration
- E. Uncertainty: accuracy of results
- F. Reporting results.

III. Standards and Dimensional Units of Measurement
- A. Establishment of dimensional standards

COURSE OUTLINE - MECH 221 (continued)

- B. Measurement standards in the United States
- C. The SI system
- D. The standard of length
- E. The standard of mass
- F. Time and frequency standards
- G. Electrical standards
- H. Conversion between systems of units
- I. Significant digits, rounding and truncation.

IV. Assessing and Presenting Experimental data
- A. Common types of error
- B. Uncertainty
- C. Estimation of precision uncertainty
  - 1. Sample vs. population
  - 2. Probability distributions
- D. Theory based on the population
- E. Theory based on the sample
  - 1. Confidence intervals
  - 2. The t-test comparison of sample means
- F. Goodness of fit
- G. Bias and single sample uncertainty
- H. Minimizing error in designing experiments
- I. Graphical presentation of data
- J. Line fitting and method of least squares.

V. Sensors
- A. Classification of first-stage devices
- B. Sliding contact devices
- C. The resistance strain gage
- D. Thermistors
- E. Thermocouples.

VI. Signal Conditioning
- A. Advantages of electrical signal conditioning
- B. Voltage dividing circuits
- C. Resistance bridges
- D. Electronic amplifiers
- E Operational amplifiers.

VII. Digital Techniques in Mechanical Measurement
- A. Digitizing mechanical inputs
- B. Fundamental digital circuit elements
- C. Number systems
- D. The digital computer as a measurements system tool
- E. Analog to digital conversion.

VIII. Displacement and Dimensional Measurement
- A. Gage blocks
- B. Temperature problems
- C. Surface roughness

COURSE OUTLINE - MECH 221 (continued)

IX. Strain and Stress Measurement
- A. Strain measurement
- B. The electrical resistance strain gage
- C. The strain gage bridge circuit
- D. Temperature compensation
- E. Calibration
- F. Stress-strain relationships
- G. Gage orientation

X. Measurement of Force and Torque
- A. Measuring methods
- B. Mechanical weighing systems
- C. Elastic transducers
- D. Strain gage load cells
- E. Torque measurement.

XI. Measurement of Pressure
- A. Static and dynamic pressures
- B. Pressure measuring systems
- C. Pressure measuring transducers
- D. Elastic diaphragms
- E. Strain gage pressure cells
- F. Calibration methods.

XII. Measurement of Fluid Flow
- A. Obstruction meters
- B. The variable-area meter
- C. Measurement of fluid velocities
- D. Pressure probes
- E. Calibration of flow measuring devices.

XIII. Temperature Measurements
- A. Use of bi-materials
- B. Thermocouples
- C. Calibration of temperature measuring devices.

XIV. Measurement of Motion
- A. Vibrometers and accelerometers
- B. Calibration
- C. Vibration test methods.

XV. Evaluation
- A. Assignments and quizzes
- B. Written reports
- C. Project presentation
- D. Exams and final exam.

MINIMUM STUDENT LAB ACTIVITIES:

1. Measurement of area with the planimeter
   - a. Draw mathematical curve

COURSE OUTLINE - MECH 221 (continued)

  b. Measure area under the curve
  c. Compare results with mathematical value

2. Measurement of mass-moment of inertia with the torsional pendulum
   a. Diameter measurement
   b. Mass measurement
   c. Period of oscillation measurement
   d. Reduce data
   e. Perform statistical calculations

3. Confirmation of Newton's law of cooling
   a. Measure temperature vs. time for the cooling of a hot liquid
   b. Reduce data
   c. Graph reduced temperature vs. time
   d. Find least squares fit and correlation coefficient

4. Installation of a strain gage on an aluminum cantilever beam
   a. Material preparation
   b. Gage adhesion
   c. Lead attachment
   d. Gage installation verification

5. Load cell calibration
   a. Install strain gages
   b. Adjust gage factor so digital readout indicates grams directly
   c. Reduce data
   d. Graph indicated load vs. applied load
   e. Find least squares fit and correlation coefficient

6. Measurement of the Modulus of Elasticity
   a. Install strain gages
   b. Measure strain for a series of known loads
   c. Reduce data
   d. Graph calculated stress vs. measured strain
   e. Find least squares fit and correlation coefficient
   f. Set the Modulus equal to the slope

7. Measurement of Poisson's ratio
   a. Install strain gages parallel and perpendicular to the axis of the beam
   b. Apply a series of loads
   c. Measure strain in perpendicular directions
   d. Reduce data
   e. Poisson's Ratio equals the ratio of the lateral to the longitudinal strain.

8. Torque meter calibration
   a. Install torque strain rosettes on a circular bar
   b. Apply a series of known torques to the bar
   c. Reduce data
   d. Graph measured torque vs. applied torque
   e. Find least squares fit and correlation coefficient.

COURSE OUTLINE - MECH 221 (continued)

9. Pressure measurement with a pressure transducer
   a. Build an 8-bit data acquisition system including a pressure transducer, amplifier, analog to digital converter, and a computer with an RS-232 port and a BASIC program for file manipulation and control
   b. Measure a dynamically varying pressure
   c. Import data file to an electronic spreadsheet
   d. Reduce data
   e. Graph pressure vs. time.

10. Displacement measurement with a rotary potentiometer
   a. Build an 8-bit data acquisition system including a kinematic mechanism, a rotary potentiometer, amplifier, analog to digital converter, and a computer with an RS-232 port and a BASIC program for file manipulation and control
   b. Measure the movement of the mechanism
   c. Import data file to an electronic spreadsheet
   d. Reduce data
   e. Graph displacement vs. time.

11. Measurement project.

CALCULUS USAGE

1. Area under a curve
2. Slope of a curve
3. Least squares fit derivation.

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

1. Written laboratory reports
2. Oral and written project presentation.

COMPUTER USAGE

1. Use of electronic spreadsheets to reduce data and prepare graphs
2. Programming in BASIC for data cquisition tasks.

COURSE OUTLINE - MECH 222

Appr:______
Date: ______

COURSE TITLE: MECH 222 Machine Design

COURSE DESCRIPTION: This course looks at the design considerations for the many machine elements used in mechanisms and machines. The student learns how to specify the size, load, capacity of and operating constraints of components such as bearings, clutches, brakes, gears, belts, and chains. Additional emphasis is placed on the layouts and drawings of the mechanism or machine.

CREDIT HOURS: Four Semester Hours

CONTACT HOURS: Lecture - 4 Hours/Week
Lab - 0 Hours/Week

PREREQUISITES: MATH 126, MECH 240

TEXTBOOK REQUIRED: Machine Design Fundamentals, by U. Hindhede, et al. Prentice Hall Publishing Company, 1983.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:		Time Allocations Lecture	Lab
I.	Introduction	4	0
	A. Know the course goals, attendance policy and grading policy		
	B. Understand friction and lubrication.		
II.	Spring Design	4	0
	A. Understand design factors		
	B. Understand coil, torsion, leaf and belleville spring design		
	C. Be able to design springs to function properly.		
III.	Bearings	4	0
	A. Understand sleeve bearing ratings, materials and lubrication		
	B. Understand antifriction bearing loads life and selection		
	C. Be able to select bearings for various situations.		
IV.	Belts	4	0
	A. Understand flat belt forces, slippage, and transverse loads		
	B. Understand V belt forces and transverse loads		
	C. Understand use of idlers and motor mounts		
	D. Be able to design typical belt installations.		
V.	Chain Drives	4	0
	A. Understand types of chains		
	B. Understand chain design constraints and forces		
	C. Be able to design typical chain installations.		

COURSE OUTLINE - MECH 222 (continued)

VI.	Gears	6	0
	A. Understand types of gears and the forces involved		
	B. Understand design constraints and selection of components		
	C. Be able to design gear trains for a desired output.		
VII.	Shaft Design	6	0
	A. Understand combined stress		
	B. Understand bearing loads, critical speeds and effect of key seats, fillets, etc.		
	C. Be able to design shaft assemblies.		
VIII.	Clutches	4	0
	A. Understand the types of clutches and their design parameters		
	B. Be able to determine design parameters for typical requirements.		
IX.	Brakes	4	0
	A. Understand the types of brakes and their design parameters		
	B. Be able to determine design parameters for typical requirements.		
X.	Power Requirement	5	0
	A. Understand power required, and resistance to motion		
	B. Understand types of power and power trains		
	C. Be able to determine power required and design a suitable system.		
XI.	Power Sources	5	0
	A. Understand the types of power sources		
	B. Understand relationships between horsepower, speed, and torque		
	C. Be able to select power sources appropriate for a design.		
XII.	Design Projects and System Design	5	0
	A. Understand the systems design approach		
	B. Be able to complete assigned design projects.		
XIII.	Exams	7	0
	A. Be able to demonstrate proficiency of material covered.		
	TOTAL	62	0

TOPICAL OUTLINE:

I. Introduction
   A. Course goals, class procedures
   B. Friction
   C. Lubrication.

II. Spring
   A. Design factors
   B. Types of springs
      1. coil

COURSE OUTLINE - MECH 222 (continued)

2. torsion
3. leaf
4. belleville.

III. Bearings
- A. Sleeve bearings
  1. ratings
  2. materials
  3. lubrication
- B. Antifriction bearings
  1. ball
  2. roller
  3. bearing loads and life.

IV. Belts
- A. Flat belts
  1. forces, slippage, transverse loads
- B. V belts
  1. forces, transverse loads
  2. idlers, motor mounts.

V. Chain Drives
- A. Types of chains
- B. Design constraints
- C. Selection of components.

VI. Gears
- A. Types of gears
- B. Design constraints
- C. Selection of components.

VII. Shaft Design
- A. Combined stress
- B. Bearing loads
- C. Critical speeds
- D. Effect of key seats, fillets.

VIII. Clutches
- A. Types of clutches
- B. Design constraints
- C. Selection of components.

IX. Brakes
- A. Types of brakes
- B. Design constraints
- C. Selection of components.

X. Power Requirements
- A. Power required
- B. Resistance to motion
- C. Types of power

COURSE OUTLINE - MECH 222 (continued)

- D. Power trains.

XI. Power Sources
- A. Types of power sources
- B. Horsepower, speed, torque
- C. Selection.

XII. Design Projects
- A. Two design projects to be worked on during the term
  1. Examples
     - a. Design a machine to move packages weighing 50 lbs at a speed of 5 mph up to 15 degree incline
     - b. Design a platform that may be raised or lowered while carrying a load. The mechanism to be powered.
  2. The project may involve a team of two or three students.

MINIMUM STUDENT LAB ACTIVITIES:

None.

CALCULUS USAGE

None.

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

Project report.

COMPUTER USAGE

Use of electronic spreadsheets for calculations and preparation of graphs.

COURSE OUTLINE - MECH 223

Appr:______
Date: 11-25-91

COURSE TITLE: MECH 223 Thermodynamics

COURSE DESCRIPTION: Thermodynamics is that branch of physics that deals with the science of energy. MECH 223 is an introduction to thermodynamics and heat transfer. This includes the study of the laws of thermodynamics, non flow and steady flow systems and conservation of mass. It also includes gas and vapor processes, steam tables, psychrometric charts and air tables. It looks at power cycles, refrigeration cycles, and combustion. The course concludes with a study of basic heat transfer, energy efficiency, heat recovery and co-generation.

CREDIT HOURS: Three Semester Hours

CONTACT HOURS: Lecture - 3 Hours/Week
Lab - 0 Hours/Week

PREREQUISITES: MATH 116, MECH 240, MECH 211, or equivalent

TEXTBOOKS REQUIRED: Thermodynamics and Heat Power, by K. C. Rolle. Merrill Publishing Company, 3rd Edition, 1989.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Allocations Lecture	Lab
I. Introduction	3	0
A. Know the course goals, the attendance policy and grading policy		
B. Understand the scientific method		
C. Understand the fundamental concepts of temperature, pressure, kinetic theory and systems of measure.		
II. Thermodynamic Laws	6	0
A. Understand the laws of thermodynamics		
B. Understand non-flow and steady flow systems		
C. Understand the specific heats		
D. Understand the ideal Carnot cycle		
E. Understand the use of entropy		
F. Be able to solve problems in energy balances and Carnot cycles.		
III. Properties of Liquids and Gases	3	0
A. Understand the changes of phase		
B. Understand the change of thermodynamic properties of internal energy, enthalpy and entropy		
C. Be able to use steam tables to find thermodynamic properties at any condition.		
IV. Ideal Gases	3	0
A. Understand the ideal gas relationships		
B. Understand the various gas processes.		

COURSE OUTLINE - MECH 223 (continued)

	C. Understand the use of gas tables		
	D. Understand the relation between real gases and ideal gases		
	E. Understand compressible flow		
	F. Be able to solve problems involving gas processes.		
V.	Mixtures of Ideal Gases	3	0
	A. Understand how to find thermodynamic properties of gas mixtures		
	B. Understand the use of psychrometric charts for water vapor/air mixture		
	C. Be able to solve problems involving gas mixtures.		
VI.	Combustion	3	0
	A. Understand the combustion process		
	B. Be able to solve combustion problems and obtain the value of heat released		
	C. Be able to determine heating values of fuels.		
VII.	Power Cycles	6	0
	A. Understand the various power cycles such as Rankine, Otto, Diesel, Brayton, Stirling, and nuclear power cycles.		
VIII.	Refrigeration	3	0
	A. Understand the reversed Carnot cycle and the basic refrigeration cycles used		
	B. Understand the heat pump cycle		
	C. Be able to solve problems involving refrigeration and heat pump cycles.		
IX.	Heat Transfer	8	0
	A. Understand the three basic modes of heat transfer: conduction, convection, and radiation		
	B. Understand heat transfer in heat exchangers		
	C. Be able to solve heat transfer problems.		
X.	Energy Efficiency	3	0
	A. Understand how to analyze existing systems		
	B. Understand how to recover heat normally lost.		
XI.	Exams	6	0
	A. Be able to demonstrate proficiency in material covered.		
	TOTAL	47	0

TOPICAL OUTLINE:

I. Introduction
   A. Course goals, syllabus, attendance policy, grading policy
   B. Scientific method
   C. Temperature, pressure, kinetic theory, systems of measure.

COURSE OUTLINE - MECH 223 (continued)

II. Thermodynamic Laws
- A. Laws of thermodynamics
- B. Non-flow and steady flow systems
- C. Specific heats, internal energy, entropy
- D. Carnot cycle.

III. Properties of Liquids and Gases
- A. Change of phase and properties of internal energy, enthalpy, entropy, and specific volume
- B. Steam tables.

IV. Ideal Gases
- A. Ideal gas relationships and processes
- B. Use of gas tablets
- C. Real versus ideal gases
- D. Compressible flow.

V. Mixtures of Ideal Gases
- A. Thermodynamic properties of mixtures
- B. Psychrometric charts and water vapor/air mixture.

VI. Combustion
- A. Combustion process and equations
- B. Heating value, air/fuel ratios, products of combustion.

VII. Power Cycles
- A. Rankine steam cycle
- B. Otto and diesel cycles
- C. Brayton, Sterling, nuclear cycles.

VIII. Refrigeration
- A. Reversed Carnot cycle
- B. Refrigeration cycles
- C. Heat pumps.

IX. Heat Transfer
- A. Conduction
- B. Convection
- C. Radiation
- D. Heat exchangers.

X. Energy Efficiency
- A. Analysis of existing system
- B. Heat recovery and co-generation.

XI. Exams.

MINIMUM REQUIRED STUDENT LAB ACTIVITIES:

None.

COURSE OUTLINE - MECH 223 (continued)

CALCULUS USAGE

1. Slope of a curve (rate of change)
2. Area under a curve (work done or heat added)
3. Power as rate doing work
4. Differential relationships involving thermodynamic state variables

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

None.

COMPUTER USAGE

Use of electronic spreadsheets for computations and preparation of graphs.

COURSE OUTLINE - MECH 240

Appr:_____
Date: 4/30/91

COURSE TITLE: MECH 240 Statics and Strength of Materials 1

COURSE DESCRIPTION: Statics and Strength of Materials studies forces and their effects on structures. This course examines forces, components, resultants, equilibrium, friction, centroids, and stress/strain relationships. The course also covers topics in strength of materials: the concepts of deformation, stress concentrations, factor of safety, torsional stress and deformation, beam stresses, combined stress, riveted joints, welded joints, and Mohr's circle of stress.

CREDIT HOURS: Four Semester Hours

CONTACT HOURS: Lecture - 4 Hours/Week

PREREQUISITES: MATH 126, PHYS 211

TEXTBOOK REQUIRED: Statics and Strength of Materials: A Parallel Approach, by L. J. Wolfe. Merrill Publishing Company, 1989.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Allocation Lecture	Lab
I. Introduction	1	0
A. Know the course goals, the attendance policy and the grading policy		
B. Understand the scientific method.		
II. Vectors Forces and Moments	3	0
A. Understand forces and resolution to components		
B. Understand use of vectors to represent forces		
C. Understand transmissibility of forces		
D. Understand addition of forces graphically and analytically		
E. Understand the moment of a force and of a couple		
F. Be able to resolve forces into rectangular components		
G. Be able to solve problems with forces, components, moments and couples.		
III. Resultant	4	0
A. Understand resultants of collinear, concurrent, and non-concurrent force systems		
B. Be able to determine resultants of forces systems.		
IV. Equilibrium	7	0
A. Understand equilibrium based on Newton's laws of motion		
B. Understand use of free body diagrams		
C. Understand solution of equilibrium graphically		
D. Understand analytical solution of equilibrium		
E. Understand two force and three force members		
F. Understand truss problems		
G. Be able to solve problems for reactions and unknown forces.		

COURSE OUTLINE - MECH 240 (continued)

V.	Friction	3	0
	A. Understand static friction		
	B. Understand impending motion		
	C. Be able to solve static friction problems.		
VI.	Centroids	3	0
	A. Understand the centroid of an area		
	B. Understand the centroid of composite areas		
	C. Understand the center of pressure and distributed loads		
	D. Be able to compute the centroid of composite areas.		
VII.	Simple Stress and Strain	4	0
	A. Understand normal, shear and bearing stress		
	B. Understand Hooke's law		
	C. Understand the relationship between axial stress and strain and information obtainable from a typical stress/strain diagram		
	D. Understand normal, bearing and shear stress calculations		
	E. Be able to solve problems involving normal, bearing, and shear stress.		
VIII.	Thin Walled Pressure Vessels	2	0
	A. Understand the stresses developed in gas filled thin walled pressure vessels		
	B. Understand the stresses developed in liquid filled containers		
	C. Be able to solve problems involving pressure vessels.		
IX.	Stress Concentrations and Factors of Safety	2	0
	A. Understand the reasons for using factors of safety		
	B. Understand the occurrence of stress concentrations		
	C. Be able to solve problems involving stress concentrations and factors of safety.		
X.	Thermal Stress and Strain	2	0
	A. Understand thermal expansion and contraction and the related stress/strain affects		
	B. Be able to solve problems involving temperature changes.		
XI.	Torsion and Angle of Twist	3	0
	A. Understand torsional shear stress relationship to torque, power transmission and shaft couplings		
	B. Understand the relationship between the angle of twist, shear stress and torque		
	C. Be able to solve problems involving torsional shafts		
	D. Be able to solve problems involving the angle of twist in shafts.		
XII.	Beam Loads, Shear and Moment Diagrams	2	0
	A. Understand beam loading, types of beams, and reactions		
	B. Understand the computation of shear and moment diagrams and the relationships between loads, shear diagrams and moment diagrams		

COURSE OUTLINE - MECH 240 (continued)

	C. Be able to draw shear and moment diagrams.		
XIII.	Bending Beams	3	0
	A. Understand the relationships between loads, shear stress and bending tension and compression stresses in beams		
	B. Be able to solve bending beam problems.		
XIV.	Built Up Beams	1	0
	A. Understand the shear stresses developed in fasteners used to manufacture built up beams		
	B. Be able to solve problems involving built up beams.		
XV.	Beam Deflections	4	
	A. Use deflection formulas to find beam deflections		
	B. Understand the relationship among load, shear, moment, angle and deflection diagrams.		
XVI.	Combined Stress	2	0
	A. Understand the use of superposition to combine loads and stresses		
	B. Be able to solve problems involving combined stresses.		
XVII.	Connections	3	0
	A. Understand load distribution through riveted joints		
	B. Understand the failure modes of tension bearing and shear in riveted joints		
	C. Understand the type of stress developed in welded joints		
	D. Be able to solve problems involving riveted, bolted and welded joints.		
XVIII.	Mohr's Circle	2	0
	A. Understand the relationship between normal and shear stresses in two dimensions		
	B. Be able to graph Mohr's circle of stress		
	C. Use Mohr's circle to find the principal stresses and the maximum shear stress		
	D. Use Mohr's circle to find the stress components in any direction.		
XIX.	Moments of Inertia of Areas	2	0
	A. Be able to compute moments of inertia of simple areas		
	B. Understand how to compute moments of inertia of composite areas		
	C. Be able to find the moments of inertia of commercially available beam sections from tables.		
XX.	Exams	9	0
	A. Show proficiency in the material covered.		
	TOTAL	62	0

COURSE OUTLINE - MECH 240 (continued)

TOPICAL OUTLINE:

I. Introduction
   A. Learning goals, syllabus, grading
   B. Attendance policy
   C. Laboratory procedures
   D. Scientific method.

II. Vectors, Forces and Moments
   A. Vectors
      1. notation
      2. transmissibility
      3. addition, subtraction
   B. Forces
      1. components
      2. addition
   C. Moments
      1. notation, sign
      2. principle of moments
      3. couples.

III. Resultants
   A. Co-linear systems
   B. Concurrent systems
   C. Parallel systems
   D. Non-concurrent systems.

IV. Equilibrium
   A. Newton's laws of motion
   B. Free body diagrams
   C. Graphical solutions
   D. Analytical solutions
   E. Two force and three force systems
   F. Trusses
      1. method of joints
      2. method of sections.

V. Friction
   A. Static and kinematic friction
   B. Sliding vs. tumbling.

VI. Centroids
   A. Centroid of an area
   B. Composite areas
   C. Center of pressure, distributed loads.

VII. Simple Stress and Strain
   A. Normal, shear, and bearing stress
   B. Hooke's Law
   C. Basic tensile test
   D. Stress/strain diagram

COURSE OUTLINE - MECH 240 (continued)

E. Modulus of elasticity
F. Poisson's ratio.

VIII. Thin Walled Pressure Vessels
A. Circumferential and tangential stresses
B. Constant pressure
C. Pressure proportional to depth
D. Effective area.

IX. Stress Concentration and Factors of Safety
A. Allowable stress
B. Factors of safety
C. Reasons for using factors of safety
D. Stress concentrations
E. Stress concentration factor
F. Net area
G. Maximum stress
H. Average stress.

X. Thermal Stress and Strain
A. Thermal strain
B. Coefficient of thermal expansion
C. Temperature change
D. Thermal deformation and physical deformation.

XI. Torsion and Angle of Twist
A. Torsion
B. Modulus of rigidity
C. Radians
D. Torsional shear stress
E. Polar moment of inertia
F. Angle of twist
G. Power transmission
H. Flange coupling.

XII. Beam Loads, Shear, and Moment Diagrams
A. Definition of a beam
B. Beam reactions
C. Internal shear force
D. Shear diagram
E. Distributed loads
F. Concentrated loads
G. Moment diagrams
H. Relationships between loads shear and moment diagrams
I. Inflection point
J. Shear and moment equations.

XIII. Bending Beams
A. Tension and compression stresses and their distribution
B. Neutral axis
C. Partial moment of area

COURSE OUTLINE - MECH 240 (continued)

D. Moment of inertia
E. Shear distribution.

XIV. Built Up Beams
A. Shear stress at surface
B. Fasteners required for shear force
C. Combined stress
D. Neutral axis.

XV. Beam Deflection
A. Beam deflection tables
B. Load, shear, moment, angle and deflection curves.

XVI. Combined Stress
A. Superposition
B. Loads in two directions
C. Combined stress
D. Neutral axis.

XVII. Connections
A. Riveted joints
1. lap joints
2. repeating section
3. force flow diagram
4. tensile, bearing, and shear loads
5. efficiency
6. double platted butt-joints
B. Welded joints
1. butt-joints
2. fillet welds
3. leg of fillet
4. throat
5. eccentric loading of welded joints.

XIII. Mohr's Circle
A. Principal stresses
B. Maximum shearing stresses
C. Plotting Mohr's Circle
D. Stress components at any angle.

XIX. Moment of Inertia of Area
A. Simple areas
B. Composite areas
C. Standard cross-sections.

XX. Exams.

MINIMUM REQUIRED STUDENT LAB ACTIVITIES:

None.

COURSE OUTLINE - MECH 240 (continued)

CALCULUS USAGE

1. Slope of a curve
2. Area under a curve
3. Derivations of formulas
   a. Torsional stress
   b. Bending stress
   c. Shear force in a beam section
4. Load-shear-bending moment diagram relationship.

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

None.

COMPUTER USAGE

Use of electronic spreadsheets for computations and preparation of graphs.

COURSE OUTLINE - ETEC 140

COURSE TITLE: ETEC-140 Engineering Graphics, Comprehensive (2+3) 3 Credits

COURSE DESCRIPTION: Comprehensive introductory course which integrates three foundational engineering graphics elements of basic manual drafting, descriptive geometry and computer aided drafting. Basic manual drafting portion offers exposure to topics used in creation and reading of engineering drawings: lettering, line types, drafting instruments, geometric construction, pictorial representation, orthographic projection, auxiliary views, sectional views, dimensioning and tolerancing. Descriptive geometry portion involves solving of complex true size and shape problems. Computer aided drafting portion permits creation of drafting and design related geometry.

CREDIT HOURS: 3 Semester Hours

CONTACT HOURS: Lecture - 2 one hour sessions/week
Lab - 2 one and one-half hour sessions/week

PREREQUISITE: None

TEXTBOOKS REQUIRED:

1. Drafting Fundamentals 1 by Steet, Cleland & Earle, Creative Publishers.
2. Geometry for Engineers 1 by Earle et al., Creative Publishers
3. AutoCAD 12 Reference

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Weight	
BASIC MANUAL DRAFTING SEGMENT	Lecture	Lab
I. Introduction A. Know the course goals, attendance and grading policy B. Understand the equipment required for the course, including lab equipment 1. Recognize and draw quality lines 2. Use required drafting equipment in the creation of manual drawings 3. Letter vertical and inclined gothic letters and numbers.	1	1.5
II. Geometric Construction A. Bisect lines and arcs B. Draw true and approximate ellipses C. Apply rules of tangency.	2	3
III. Pictorial Sketching A. Draw in oblique style, both cavalier & cabinet B. Draw in isometric style C. Convert multiview drawings into pictorial sketches.	2	3

COURSE OUTLINE - ETEC 140 (continued)

		Lecture	Lab
IV.	Orthographic Projection and Sketching	2	3
	A. Select the correct and required views of an object		
	B. Draw multiview orthographic drawings and sketches		
	C. Project missing lines and views		
	D. Identify normal, inclined and oblique lines and surfaces.		
V.	Auxiliary Views	2	3
	A. Draw the primary auxiliary view of any simple incline.		
VI.	Sectional Views	1	1.5
	A. Section an object as required		
	B. Draw and identify all of the sectional view types.		
VII.	Dimensioning and Tolerancing	2	3
	A. Apply proper dimensioning techniques to an object		
	B. Dimension an object using fractional, decimal and metric values		
	C. Apply limit and equal bilateral tolerances to mating objects to insure proper fit		

DESCRIPTIVE GEOMETRY SEGMENT

		Lecture	Lab
I.	Secondary Auxiliary Views	2	3
	A. Develop and label all components in both primary and secondary auxiliary views		
II.	Points, Lines and Planes	2	3
	A. Find and define points, true length lines and true size planes and angles in space		
III.	Slope, % Grade, Bearing	2	3
	A. Find the slope, % grade and bearing of oblique lines and planes		
IV.	Intersections and Developments	2	3
	A. Draw orthographic views of a prism, cylinder, pyramid and cone		
	B. Develop a flat pattern of various 3D objects		
	C. Draw the intersections of various 3D objects		

COMPUTER AIDED DRAFTING SEGMENT

		Lecture	Lab
I.	Introduction to CAD	1	1.5
	A. Identify the parts of a computer graphics system and describe each of their functions		
	B. Explain the construction of the command syntax		
	C. Create basic geometry, file geometry, exit system and edit same geometry		
II.	Creating Basic Geometry and Related Functions	1	1.5
	A. Create points, lines, planes, circles and fillets		
	B. Erase geometry from screen		

COURSE OUTLINE - ETEC 140 (continued)

		Lecture	Lab
	C. Understand and use control features for end and midpoints of lines, tangents, and centers for circles		
	D. Generate a hardcopy		
III.	Screen Control	1	1.5
	A. Use the screen control commands to create and view geometry		
IV.	Inputting Coordinate Data	1.	1.5
	A. Create geometry using absolute and incremental Cartesian coordinate data		
V.	Inserting Lines and Line Options and Circle/Arc Options	1	1.5
	A. Construct geometry of a specific size using line and circle options		
VI.	Construction Planes	1	1.5
	A. Create a 3D part using the system of construction planes		
VII.	Advanced Applications	2	3
	A. Customization with colors		
	B. Create 3D models and alter geometry in all views		
	C. Create geometry on different layers		
	D. Use dimensioning commands to dimension parts		
	E. Manipulate geometry using mirror, and rotate		
	F. Crosshatch sectioned details		
	G. Plat a finished drawing		
	H. Use and create macros		
EVALUATION		2	3
	Total Hours	30	45

CALCULUS USAGE

None.

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

None.

COMPUTER USAGE

College of Technology computer facilities and CAD software.

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COURSE OUTLINE - MFGT 150

Course: MFGT-150
(Formerly: MTT-190)
Date: 1/25/94

COURSE TITLE: MFGT 150 Manufacturing Processes

COURSE DESCRIPTION: This is a basic course that when completed a student will know the fundamentals and be able to operate common machine tool equipment like an engine lathe, band saw and horizontal and vertical milling machine. Also covered will be measuring and inspection tools, drill press and surface plate.

CONTACT HOURS: Lecture - 1 Hour/Week
Lab - 3 Hours/Week

TEXTBOOKS REQUIRED: Technology of Machine Tools, 4th Ed., Krar/Oswald

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Weight Lecture Hours	Lab Hours
I. Introduction, Orientation and Safety	1	3
A. Know the course goals, the attendance policy, and the grading policy		
B. Know general shop safety rules		
C. Develop an appreciation for safe working habits		
D. Use safe working habits while working on or around metal working machines.		
II. Measurement and Inspection	3	10
A. Measure assorted parts using precision measuring tools		
B. Evaluate and check parts to determine if they are manufactured to print specifications		
C. Check parts for geometric tolerancing (Perpendicularity, parallelism and concentricity)		
D. Evaluate and compare surface finishes		
E. Understand and use various thread gauges		
F. Evaluate and use Go/No-Go gauges		
G. Assemble two existing mating parts with slight press fits and/or slip fits the product.		
H. Develop an appreciation for cost as it relates to tighter tolerances and more precision machining without improving the product.		
I. Write an inspection report on a produced part.		
III. Bench Work and Hand Tools	1	3
A. Identify and know the correct use of files including basic shapes and cuts.		
B. Correctly use files to remove burrs.		
C. Identify and correctly use a file card.		
D. Identify and correctly use both machinists' and soft faced hammers.		

COURSE OUTLINE - MFGT 150 (continued)

	E. Identify, correctly use, and maintain prick punches, center punches, and knockout pins.		
	F. Know the correct practices for using and maintaining a hand hack and blade.		
	G. Identify common taps.		
	H. Select taps for specific applications.		
	I. Tap holes by hand.		
	J. Identify dies used for hand threading.		
	K. Select, adjust and cut threads with a die.		
IV. Drilling		1	4
	A. Understand the capabilities and limitations of drilling machines and drilling processes		
	B. Demonstrate the ability to accurately layout and drill holes to part specifications		
	C. Understand the tolerance capabilities of drilling, reaming, and tapping operations		
	D. Drill and counterbore a hole for a specified capscrew		
	E. Determine the tap drill size required for tapping operation.		
V. Milling		2	10
	A. Identify the various types of milling machines		
	B. Know the capabilities and limitations of various milling machining processes		
	C. Know various milling cutters and their holders		
	D. Be familiar with side milling, straddle milling, end milling, face milling, and boring as they are performed on milling machines		
	E. Be familiar with the advantages and disadvantages of climb and conventional milling		
	F. Be familiar with work holding devices for milling operations		
	G. Perform a milling operation after set-up by the instructor.		
VI. Engine Lathe		2	10
	A. Know the capabilities and limitations of the lathe		
	B. Face and turn a work piece mounted in a three jaw chuck after set-up by the instructor		
	C. Perform a rough turning and finish turning operation, after set-up by the instructor		
	D. Be familiar with cutting tapers and angles with the taper attachment and the compound rest		
	E. Identify knurling applications and problems		
	F. Understand the thread cutting operation as it is done on the lathe		
	G. Write an inspection report on a produced part.		
VII. Surface Grinder and Floor Grinders		1	5
	A. Be familiar with surface grinding procedures and processes		
	B. Recognize work-holding devices used on surface grinding operations		
	C. Know purpose, capabilities and limitations of the surface grinding process		

COURSE OUTLINE - MFGT 150 (continued)

D. Develop and use safe work habits in the use of guards and other protective devices on the floor grinder.
E. Identify and mount the desired types of grinding wheels.
F. Dress and true the grinding wheel.
G. Position the tool rest and safety shield.

VIII. Electrical Discharge Machine (EDM) 1

A. Be familiar with EDM procedures and processes

IX. Quizzes and Final Exam 3

TOTAL 15 45

TOPICAL UNIT OUTLINE OF MAJOR UNITS OF INSTRUCTION:

I. Introduction, Orientation and Safety
- A. Course goals
- B. Requirements for attendance, grading, theory and lab work
- C. General shop safety rules and safe work habits (Students turn in signed copy of General Safety Rules for Machine Shop).

II. Measurement and Inspection
- A. Steel rules and inch - metric systems
  1. rules - inch and metric
  2. comparison measuring instruments
- B. Micrometer measuring devices
  1. outside micrometer
  2. inside micrometer
  3. depth micrometers
- C. Vernier measuring devices
  1. Vernier calipers
  2. Vernier height gages
  3. Vernier protractor
- D. Go/No Go gauges
  1. threading
  2. bore diameters
  3. tapers
- E. Tolerances and precision machining
  1. tighter tolerances in relation to cost
  2. improving the product by precision machining and tighter tolerances
  3. CMM (Coordinate Measuring Machine).

III. Bench Work and Hand Tools
- A. Files and file card
  1. types
  2. uses
- B. Hammers
  1. machinist
  2. soft faced
- C. Hacksaw

COURSE OUTLINE - MFGT 150 (continued)

- D. Taps and Dies
  1. identification
  2. selection.

IV. Drilling Machine
- A. Drilling machine nomenclature
  1. sizes
  2. types
  3. uses
- B. Cutting tools
  1. straight shank
  2. taper shank
  3. drill bits
  4. reamers
  5. counterbores
  6. countersinks
- C. Speed and feeds
- D. Basic drilling machine set up.

V. Milling
- A. Identify types of milling machines
- B. Mill capabilities and limitations
- C. Vertical and horizontal milling cutters and holders
- D. Types of milling
  1. side milling
  2. straddle milling
  3. end milling
  4. face milling
  5. boring
- E. Climb and conventional milling
- F. Work holding devices for milling operations.

VI. Tool Room Lathe
- A. Lathe capabilities and limitations
- B. Basic lathe operations
  1. turning (rough and finish)
  2. facing
  3. grooving
  4. cut off
- C. Cutting tapers
  1. compound rest
  2. taper attachment
  3. tailstock set over
- D. Knurling applications and problems
- E. Thread cutting operation

VII. Surface Grinder and Floor Grinder
- A. Surface grinder
  1. purpose
  2. capabilities of grinding process
  3. limitations of grinding process

COURSE OUTLINE - MFGT 150 (continued)

B. Work holding devices
C. Floor Grinder
   1. identification
   2. processes

MINIMUM REQUIRED STUDENT LAB ACTIVITIES DEFINED

1. Precision measuring tools exercise; measure assorted parts.
2. Inspection exercise; check parts to determine if they are manufactured to print specifications.
3. Surface finish exercise; compare and evaluate.
4. Press fit and/or slip fit exercise; mate parts with slip or press fit.
5. Layout exercise; layout plate piece part to the dimensions given on print.
6. Plate exercise; square a part on the milling machine. Then drill, ream, tap, and counterbore with tolerance of the print.
7. Shaft exercise; face, turn, groove, centerdrill, and chamfer a piece part within tolerance of the print.
8. Inspection report exercise; a written report on the shaft and plate piece part made by the student.

Grade Breakdown

A. Lecture 50% of Final Grade
   Lab 50% of Final Grade

B. Lecture Grade
   1. Quizzes and Attendance 2/10
   2. Unit Tests 5/10
   3. Final Exam 2/10
   4. Written Report 1/10

C. Lab Grade
   1. Exercises and Attendance 1/10
   2. Lab Projects 9/10

GRADING SCALE:

95 - 100 = A
93 - 94 = A-
91 - 92 = B+
88 - 90 = B
85 - 87 = B-
83 - 84 = C+
80 - 82 = C
77 - 79 = C-
74 - 76 = D+
71 - 73 = D
69 - 70 = D-
0 - 68 = F

CALCULUS USAGE

None.

Mechanical Engineering Technology
Accreditation Report
1996-1997

Section 4 of 5

COURSE OUTLINE - MFGT 150 (continued)

ORAL AND WRITTEN COMMUNICATION REQUIREMENTS

None.

COMPUTER USAGE

None.

PREPARED BY: Dennis Finney / Jack Gregory

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COURSE OUTLINE - EEET 215

COURSE TITLE: EEET 215 ELECTRONIC TECHNOLOGY FOR MET I

COURSE DESCRIPTION: Course covers the basics of DC and AC, voltage, current, resistance, series, parallel and series-parallel. Inductance and capacitance is covered, including RC, RL, and resonant circuits. Three-phase is introduced. Basics of AC and DC motors and generators are covered.

CREDIT HOURS: 4

CONTACT HOURS: 3 LECTURE - Hours/Week
3 LAB - Hours/Week

COURSE PREREQUISITES(S)/CO-REQUISITE(S): Enrolled in MET program. MATH 126

REQUIRED TEXTBOOKS AND REFERENCE MATERIALS:

LECTURE:

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Lecture Hours	Weight Lab Hours
I. Introduction, orientation, and safety 1. Know the course goals, the attendance policy, and grading policy 2. Know lab report formats 3. Know shock hazards and emergency shut-off buttons.	1	0
II. Basic D.C. Circuit Parameter 1. Know descriptive qualities of voltage, current, and resistance 2. Know the units of measurement for each parameter 3. Know measuring instruments and how they are connected.	2	6
III. Basic Series Circuit Relationships 1. Know Ohm's Law 2. Apply law to series circuits 3. Compute component power.	3	3
IV. Basic Parallel Circuit Relationships 1. Know Kirchoff's laws 2. Apply law to parallel circuits 3. Compute series - parallel circuits.	2	3
V. Bridge, Thevenin, Magnetics 1. Know how to balance a bridge circuit 2. Know how to Thevenize a circuit 3. Know magnetic motor and generator action.	3	3
VI. Sine waves and A.C. Voltages 1. Know how A.C. voltages are created 2. Know how to find peak, RMS and instantaneous values 3. Know how to represent AC voltages using phasors.	3	6

COURSE OUTLINE - EEET 215 (continued)

	Time	Weight
VII. Capacitors 1. Know how to combine capacitors in series and parallel circuits 2. Know how capacitors affect A.C. and D.C. currents.	2	3
VIII. Inductors 1. Know how to combine inductors and series and parallel circuits 2. Know how inductors affect A.C. and D.C. circuits.	2	3
IX. RC and RL Circuits 1. Know the affects of an RC and RL circuit on A.C. circuits.	2	3
X. RLC Circuits 1. Know what series resonance is 2. Know what parallel resonance is.	2	6
XI. Three Phase Circuits 1. Compute volts, amps, and power for a delta connection 2. Compute volts, amps, and power for a wye connection.	3	0
XII. Transformers: 1. Know how transformers work 2. Compute turns ratio, efficiency, and power rating.	3	3
XIII. D.C. Motors and Generators 1. Know operating principles 2. Know construction characteristics 3. Know various types and their operating characteristics.	3	0
XIV. A.C. Generators and Motors 1. Know principles of operation 2. Know operating characteristics 3. Know types and how they differ.	3	6
XV. Single Phase Motors 1. Know types and how they differ 2. Know starting characteristics.	2	0
XVI. Tests.	6	0
	45	45

TOPICAL UNIT OUTLINE OF MAJOR UNITS OF INSTRUCTION:

I. Introduction, Orientation, and Safety
   A. Course goals
   B. Requirements for attendance, grading, theory and lab work
   C. General lab rules on safety and work habits
   D. Electrical action on the body and different degrees of shock..

II. Basic D.C. Circuit Parameters
   A. Voltage, volts
   B. Current, amperes

COURSE OUTLINE (continued)

C. Resistance, Ohm
D. VOM meter and DVM meter
E. Meter connections.

III. Basic Series Circuit Relationships

A. Ohm's Law
B. Kirchoff's Voltage Law
C. Total circuit resistance
D. Power calculations.

IV. Basic Parallel Circuit Relationships

A. Ohm's Law
B. Kirchoff's Current Law
C. Equivalent circuit resistance
D. Power calculations.

V. Basic Combination Circuits

A. Series-parallel circuit calculations.

VI. Basic A.C. Circuit Parameters

A. Inductance and inductive reactance
B. Capacitance and capacitive reactance
C. Phase angles
D. Total impedance triangle
E. Voltage and current vectors
F. Three Phase circuits
G. Transformer action
H. Resonant circuits
I. Oscilloscope operation.

VII. Basic Generator and Motor Operation

A. Induction
B. A.C. and D.C. generation
C. Motor action
D. Motor characteristics.

MINIMUM REQUIRED STUDENT LAB ACTIVITIES DEFINED

1. Multimeters and Resistors: Use the resistor color code to estimate resistor values. Measure the resistors with VOM and determine tolerance.

2. Series D.C. Circuits: Construct D.C. resistive circuits and measure volts, amperes, and calculate values for checking measurements.

3. Parallel D.C. Circuits: Construct D.C. resistive circuits and measure volts, amperes, and calculate values f or checking measurements.

4. Magnetics: Use coils, magnets, and compasses to verify the existence of magnetic fields and to demonstrate generator action.

5. Signal Generator: Use the oscilloscope to see waveforms and Oscilloscopes generated by the signal generator, measure peak volts and wave time durations.

6. Capacitors: Measure capacitive reactance and see the effects of frequency.

COURSE OUTLINE (continued)

7. Inductors: Measure inductive reactance and see the effects of frequency.

8. RC and RL Circuits: Measure time constants of various circuits. Observe phase angle relationships.

9. RLC Circuits: Measure and observe effects of resonant circuits.

10. Transformers: Measure, observe, and compute primary and secondary voltages and compare with turns ratio.

11. A.C. Motor Controls: Connect various motor control configurations and observe the results.

COURSE OUTLINE - EEET 225

COURSE TITLE: EEET 225 ELECTRONIC TECHNOLOGY FOR MET II

COURSE DESCRIPTION: A continuation of EEET 215, this course introduces special circuits including clippers and clampers; special devices including special diodes, FET's and thyristors; Amplifiers and amplifier applications. Further exposure to the oscilloscope and other measuring instruments. Digital fundamentals, control devices and programmable logic controllers are covered.

CREDIT HOURS: 4

CONTACT HOURS: 3 Lecture - Hours/Week
3 Lab - Hours/Week

COURSE PREREQUISITES: EEET 215

REQUIRED TEXTBOOKS and REFERENCE MATERIALS:

LECTURE: Essentials of Electronics - A Survey by Frank D. Petruzella ; Glenco, 1993.
Electrical Controls for Machines, 3rd Ed. by Rexford ; Delmar, 1987

LAB: Understanding Electricity & Electronics, by Patrick & Fardo, Prentic-Hall, 1989

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:		Time Weight Lecture Hrs.	Lab Hrs.
I.	Introduction, Orientation, and Safety 1. Know the course goals, attendance and grading policies 2. Know the Lab report format 3. Know shock hazards and emergency procedures.	1	0
II.	Unregulated Power Supplies 1. Know the principle of rectification 2. Know how individual rectifiers can be configured in half-wave, full-wave, and bridge configurations 3. Know the principle of power supply filtering.	1	2
III.	Zener Diodes and Voltage Regulation 1. Know how a zener is biased and the characteristics of the zener IE curve 2. Know how a zener can be used to build a regulated power supply.	1	1
IV.	Clippers, and Clampers 1. Know the purpose and operation of a clipper circuit 2. Know the purpose and operation of a clamper circuit.	1	0
V.	Bi-polar Transistors (BJT's) 1. Know the basic construction and currents in the two types of BJT's	2	0
		Lecture Hrs.	Lab Hrs.

COURSE OUTLINE - EEET 225 (continued)

2. Know what biasing means and how a BJT is biased
3. Know the two different modes of operation of BJT's and how each is biased.

VI. BJT Amplifiers	3	3
1. Know what a Class A, B, and C amplifier is in terms of biasing and conduction angle		
2. Know the characteristics of a C.E. amplifier and how to measure the gain		
3. Know the characteristics of a C.C. amplifier.		
VII. FET's 2	3	
1. Know the construction, characteristics and operation of the J-FET		
2. Know the construction, characteristics and operation of the MOSFET.		
VIII. FET Amplifiers	3	3
1. Know a FET amplifier is biased		
2. Know how to determine and measure the gain of a FET amplifier.		
IX. Unijunction Transistors and Phototransistors	1	0
1. Know the construction and characteristics of the UJT		
2. Know the construction and characteristics of the phototransistor.		
X. Thyristors 2	3	
1. Know the construction of the thyristor		
2. Know the characteristics and applications of the SCR and TRIAC.		
XI. Power Amplifiers	1	3
1. Know the requirements and characteristics of a power amplifier		
2. Know the operation of a Class B push-pull amplifier.		
XII. Differential and Operational Amplifiers	4	6
1. Know the operation of a differential amplifier		
2. Know the basic specification of a general purpose op-amp		
3. Know the basic op-amp configurations and the characteristics of each.		
XIII. Measuring Instruments	1	0
1. Know the specifications of an oscilloscope		
2. Know the specifications of a DMM and VOM.		
XIV. Power Systems	1	0
1. Know the various 3-phase power source and load connections		
2. Know P, Q, and S and power factor		

COURSE OUTLINE - EEET 225 (continued)

	Lecture Hrs.	Lab Hrs.
3. Know why and how power factor correction is performed.		
XV. Relay Logic and Ladder Diagrams	3	3
1. Know the various types of relays and relay contacts		
2. Know how to draw and read a ladder diagram for a particular application.		
XVI. Control Systems and Components	5	6
1. Know the basic theory of a control system		
2. Know the difference between closed-loop and open-loop control systems		
3. Be able to describe the operation of a control system by using the system block diagram		
4. Know the basic components of a control system		
5. Know how to perform a Bode Plot analysis, given the block diagram and how to determine the steady state and transient response		
6. Know how to perform basic control system modifications.		
XVII. Digital Systems	6	6
1. Know the theory of digital electronics		
2. Know binary and hex number representations and how to convert to each to and from the decimal value		
3. Be able to calculate and perform Boolean algebra and relate to logical functions and circuits		
4. Know the basic operation of logic gates and flip-flops		
5. Know the basic architecture of a computer and the function of each block.		
XVIII. Introduction to the P.L.C.	3	6
1. Know the basic P.L.C. symbols and basic P.L.C. operations		
2. Know the various types of I/O, safety circuits, timers, control relays, and latching relays.		
XIX. EXAMS.	4	0
Totals	45	45

TOPICAL UNIT OUTLINE OF MAJOR UNITS OF INSTRUCTION:

I. Introduction, Orientation, and Safety
1. Course goals, attendance, and grading policies
2. Required homework and lab formats
3. Shock hazards and current levels
4. Emergency procedures.

II. Unregulated Power Supplies
1. Rectification principle
2. Various rectifier configurations
3. Power supply filtering.

COURSE OUTLINE - EEET 225 (continued)

III. Zener Diodes and Voltage Regulation
1. The Zener IE curve
2. The Zener regulator and its active range of load current.

IV. Clippers and Clampers
1. Clipper circuit operation and applications
2. Clamper circuit operation and application.

V. Bi-polar Transistors (BJT's)
1. NPN and PNP construction and current flow
2. Alpha and Beta
3. amplification and switching modes of operation.

VI. BJT Amplifiers
1. Biasing for Class A, B, and C operation and corresponding conduction angle
2. The C.E. configuration - biasing, gain, input impedance, output impedance, DC and AC coupling
3. The C.C. configuration - biasing, gain, input impedance, output impedance, DC and AC coupling.

VII. FET's
1. JFET's- structure and proper biasing
2. MOSFET's, depletion and enhancement devices - structure and proper biasing.

VIII. FET Amplifiers
1. Biasing and gain calculations.

IX. Unijunction Transistor
1. Structure , biasing, currents and operation.

X. Thyristors
1. SCR - structure and principles of operation
2. SCR - DC and AC operated circuits
3. TRIAC - structure and principles of operation.

XI. Power Amplifiers
1. Power and current gain, output impedance, Db's
2. Class-B BJT Power amplifier operation.

XII. Differential and Operational Amplifiers
1. Differential amplifier operation - common-mode and differential gain
2. The ideal op-amp
3. The practical op-amp
4. Typical general purpose op-amp specifications
5. Inverting and non-inverting configurations
6. Summers and Integrators
7. Comparators.

XIII. Measuring Instruments
1. Oscilloscope specifications, capabilities and limitations

COURSE OUTLINE - EEET 225 (continued)

2. DMM and VOM specifications, capabilities and limitations
3. Watt and Var meters.

XIV. Power Systems
1. Single phase and 3-Phase power systems
2. Delta and Wye source and load connections
3. Voltage, current, and power measurements
4. Power factor and P.F. correction.

XV. Relay Logic and Ladder Diagrams
1. N.O. , N.C. contacts, relay coils
2. On-Delay and Off-Delay Relays
3. Ladder Diagrams - reading and drawing.

XVI. Control Systems and Components
1. General Knowledge and Theory - closed-loop and open-loop
2. System Block Diagrams - steady state and transient response
3. System Bode Plots
4. Components - syncros, servos, gear trains, and potentiometers.

XVII. Digital Systems
1. General Theory and Knowledge
2. Number systems and conversions
3. Boolean Algebra
4. Basic logic gates
5. Basic Flip-Flops, edge and level triggering
6. A/D and D/A conversion
7. Basic computer architecture and block functions.

XVIII. Introduction to the P.L.C.
1. Basic information and block diagram
2. Develop a simple program to implement some function
3. Programming the controller
4. Connecting I/O devices and running the program.

MINIMUM REQUIRED STUDENT LAB ACTIVITIES DEFINED:

		LAB ACTIVITY
1.	Unregulated Power Supplies	Construct a half wave, and full-wave bridge rectifier and measure the DCand AC output voltages with and without a capacitive filter connected .
2.	Voltage Regulation	Connect a resistor and zener diode to an unregulated power supply and measure the output DC and AC voltage.
3.	Bi-polar Transistor Amps	Construct a C.E. amplifier and measure the DC bias currents and AC gain with and without a load resistor connected

COURSE OUTLINE - EEET 225 (continued)

4.	FET Transistor Amps	Construct a FET amplifier and measure the DC bias currents and AC gain with and without a load resistor connected.
5.	Thyristors	Construct a SCR power control circuit and investigate the operation using both a DC and AC power source.
6.	Power amplifiers	Construct a Class B BJT power amp and compare the power gain and linear operating range to the previously constructed C.E. amp.
7.	Operational Amplifiers	Construct an inverting, non-inverting, summer, and comparator op-amp configuration and investigate the operation of each.
8.	Relays	Connect various relays to perform basic logical functions.
9.	Control Systems	Construct a motor control circuit to start, stop, reverse, and jog a motor.
10.	Digital Systems	Breadboard various basic logic gates Breadboard various combinational Breadboard various flip-flops and verify truth table.
11.	P.L.C.'s	Create a ladder logic diagram to perform a basic control function, down load to the P.L.C. and verify proper operation.

COURSE OUTLINE - MATL 240

Course: MATL-240
Date: 5/26/93

COURSE TITLE: MATL 240 Introduction to Material Science

COURSE DESCRIPTION: An introductory course in the study of the science of engineering materials: metals, polymers, and ceramics. Included in the topics of study are atomic structure and bonding, properties, selection and testing of materials, failure modes, methods of production and fabrication, methods of changing properties including heat treatment of metals, alloying and surface treatments, mechanical working, composites and compound bonding. The common classification systems used to identify the various engineering materials are also covered.

CREDIT HOURS: 4 Semester Hours

CONTACT HOURS: Lecture - 3 hours per week
Lab - 2 hours per week

PREREQUISITES: None

TEXTBOOK REQUIRED: Engineering Materials: Properties and Selection, by Kenneth Budinski. Prentice Hall Publishing Company, Fourth Edition.

Additional Materials: Laboratory Manual - Introduction to Material Science, MATL-240, by David Anderson, University Copy Center.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

The student will:	Time Weight Lecture	Lab
I. Introduction and Orientation	1	2

Know course goals, attendance and grading policies, laboratory safety rules and practices, and laboratory report guidelines. Understand basic characteristics, properties and applications of three types of engineering materials.

II. Scientific Method 1

Know the relationship of material science to the basic sciences and engineering fields of study. Know the methods used by scientists to organize and interpret their knowledge and discover new knowledge.

THE SCIENTIFIC METHOD.
Understand that all application properties and performance are the result of the material's composition, atomic structure, bonding and the material's environment during processing and in service.

III. Structures of Materials	2	

Review basic chemistry and nature of engineering materials (micro and macro). Understand basic atomic and crystalline structures.

IV. Properties and Selection	3	6

Understand the basic concepts of physical, chemical and mechanical properties of engineering materials. Know the basic methods of testing and

COURSE OUTLINE - MATL 240 (continued)

	Lecture	Lab
interpreting test results.		
V. Failure Modes Understand the service conditions that cause the various failure modes to occur. How type and rate of loading, temperature and microstructure change the type of fracture.	1	
VI. Principles of Polymeric Materials Understand how polymerized organic materials form engineering materials, chemical make-up of polymeric materials, techniques used to strengthen polymers and techniques used to form polymers into useable shapes.	2	4
VII. Polymer Chemistry and Composites Understand the basic families of plastics that are available for design and use. Know the chemical difference between various plastics. Know the basics of elastomers, types and uses. Understand the chemistry and processing of polymer composites. Know where these composites can be used in engineering design.	4	
VIII. Engineering Plastics, Polymeric Coating and Adhesives Understand how engineering plastics and polymeric coatings are used in engineering design. Basic understanding of advantages and limitations of plastics in service applications. guidelines for selections of polymers for coatings and adhesives.	2	
IX. Engineering Applications of ceramics. Understand the composition and morphology of ceramics, glass, carbon products and cemented carbides. Have a working knowledge of how to select and use these materials in service applications.	2	2
X. Production of Iron and Steel Know the basic principles and production processes used in the production of iron and steel. Understand that quality of the steel product varies with manufacturing methods. Understand steel terminology and classification systems.	2	
XI. Metal Alloy Systems and Equilibrium Diagrams Understand the basic principles of alloying, common alloy types and their equilibrium diagrams, and the relationship between the diagrams, microstructure and properties.	1	2
XII. Solid State Microstructure of Steel Interpret the basic iron-carbon equilibrium diagram.	1	
XIII. Heat Treatment of Steel Understand the various heat treatment processes and the resulting microstructures and changes they cause in steel properties.	2	6
XIV. Surface Hardening of Steel Understand the various surface hardening processes and how these	2	2

COURSE OUTLINE - MATL 240 (continued)

	Lecture	Lab
processes change the microstructure and properties.		
XV. Classification and Selection of Low Alloy Steels Know the various classification systems used for low alloy steels and the effects of alloying elements on the microstructure and properties.	2	
XVI. Classification and Selection of Tool Steels Know the classification systems for tool steels and principles used for selection of steels for service applications.	2	2
XVII. Corrosion Know the basic nature of corrosion and common techniques used in corrosion control.	1	2
XVIII. Stainless Steels Know the classification system for stainless steels and the principles used for selection of these steels for service applications. Know effects of allowing elements on microstructure and properties.	2	
XIX. Casting Processes Understand the various casting principles, processes and capabilities (tolerances, finish, etc.).	1	
XX. Cast Irons Know the classification systems, properties, microstructure, heat treatment, and applications of cast irons.	2	
XXI. Powder Metals Understand the basic principles of the powder metal process and their application areas.	1	
XXII. Aluminum Know the basic properties, methods of changing properties, applications and classifications of pure aluminum and aluminum alloys.	2	
XXIII. Copper Know the basic properties, methods of changing properties, applications and classifications of pure copper and copper alloys.	1	
XXIV. Other Non-ferrous Metals Know the basic properties, methods of changing properties, applications of nickel, titanium, zinc, magnesium and refractory metals.	2	
XXV. Plating and Conversion Coatings Understand the principles of plating and conversion coating, their applications and properties.	2	
XXVI. Selection Process and Failure Prevention Apply the principles and concepts of engineering materials to service applications. What are main service requirements, most likely mode of	2	2

COURSE OUTLINE - MATL 240 (continued)

	Lecture	Lab
failure, and selection process used to prevent premature failure.		
XXVII. Examinations	6	
	47	30

TOPICAL UNIT OUTLINE OF MAJOR UNITS OF INSTRUCTION

I. Introduction and Orientation
  A. Introduction
    1. class section
    2. class hours
    3. course syllabus
    4. grading policy
    5. attendance
    6. reading assignments
    7. laboratory safety rules.
  B. Orientation
    1. definitions
      a. polymers, ceramics, metals and composites
      b. properties: chemical, mechanical, physical
      c. service requirements, application areas
      d. raw material processing into base material
      e. forming base material into product
      f. service life and recycling.

II. Scientific Method
  A. Basic science relationship to applied science
  B. Scientific method
    1. role in everyday life and the professions
    2. role in technology and other fields
    3. steps in the method
      a. stating the problem
      b. forming the hypothesis
      c. observing and experimentation
      d. interpreting the data
      e. drawing the conclusions.

III. Structure of Materials
  A. Atoms
    1. protons, neutrons and electrons
  B. States of matter
    1. solid, liquid and gas
  C. Chemical bonding
    1. ionic, covalent, metallic and van der Waals
  D. Solid state
    1. crystalline space lattice
      a. body centered cubic
      b. face centered cubic
      c. hexagonal close pack
    2. amorphous

COURSE OUTLINE - MATL 240 (continued)

3. organic and non-organic
4. ferrous and non-ferrous
5. pure, alloys and composites

F. Relationship of structure to properties
1. grain size
2. crystal structure versus strength, ductility
3. anisotropy.

IV. Properties of Materials and Material Testing

A. Mechanical
1. static and dynamic loading
2. stress and strain
3. hardness
    a. Rockwell
    b. Brinell
    c. Shore durometer
    d. Shore sclerscope
    e. Knoop
    f. absolute
4. tensile
    a. proportional limit
    b. stiffness - modulus of elasticity
    c. elastic limit
    d. yield strength
    e. ultimate tensile strength
    f. Poisson's ratio
    g. elastic and plastic deformation
    h. ductility - % elongation and reduction in area
    I. malleability
    j. n, m and r values
    k. toughness
5. impact
    a. Charpy and Izod test
    b. drop weight
    c. nil ductility transition temperature
6. endurance
    a. fatigue test
    b. endurance limit
7. creep testing
8. work or strain hardening
9. Hot versus cold working
    a. re-crystallization
10. flexural strength
11. shear strength
12. wear
13. machinability

B. Chemical properties
1. composition
2. structure
3. atomic number and weight
4. chemical valence

COURSE OUTLINE - MATL 240 (continued)

5. compounds
6. electromotive potential
    a. oxidation
    b. reduction
    c. corrosion
7. diffusion
8. stereo-specificity
9. flammability

C. Physical properties
1. coefficient of linear expansion
2. density, specific gravity
3. thermal conductivity
4. electrical conductivity
5. color
6. magnetic susceptibility
7. melting point
8. curie point
9. refractivity index
10. heat distortion temperature
11. water absorption
12. dielectric strength.

V. Failure Modes

A. Failure analysis
1. types of failure
    a. ductile
    b. brittle
    c. fatigue
    d. creep
2. procedure - investigation
3. effect of stress risers
4. effect of strength reduction
    a. inclusion
    b. improper heat treatment
5. effect of environment
    a. corrosion
    b. temperature
    c. wear.

VI. Principles of Polymeric Materials

A. Natural and manufactured polymers
1. lignin
2. polymer - plastic

B. Polymerization reaction
1. addition
2. condensation
3. cross linking

C. Basic types
1. thermoplastic
2. thermoset
3. engineering plastics

COURSE OUTLINE - MATL 240 (continued)

D. Strengthening mechanisms
   1. linear polymers
   2. branching polymers
   3. cross linked
   4. chain stiffening
   5. plasticizing
   6. fillers
   7. blending and alloying
E. Fabrication techniques
   1. injection molding
   2. compression molding
   3. transfer molding
   4. blow molding
   5. extrusion
   6. thermo forming
   7. calendering.

VII. Polymer Chemistry and Composites
A. Thermoplastic families
   1. commodity
   2. general use
B. Thermo setting
   1. commodity
   2. general use
C. Elastomers
   1. natural rubber
   2. thermoplastic elastomer
D. Polymer composites
   1. definition of composites
   2. reinforcement types
   3. matrix materials
   4. reinforcement materials
   5. fabrication techniques
   6. application areas.

VIII. Engineering Plastics, Polymer Coatings and Adhesives
A. Selection of plastics - methodology
   1. ASTM
   2. SPI - Society of Plastic Industries
   3. data based systems
B. Structural components
   1. properties
      a. expansion
      b. stiffness
      c. creep
      d. flammability
      e. notched toughness
      f. fatigue
      g. anisotropy
      h. moisture absorption
      i. mechanical properties

COURSE OUTLINE - MATL 240 (continued)

C. Wear and friction applications
D. Corrosion applications
E. Electrical applications
   1. dielectric strength
   2. resistivity
   3. dielectric constant
F. Polymeric coating
G. Adhesives
H. Recycling of plastics.

IX. Engineering Applications of Ceramics
   A. Nature of ceramics
      1. definition
      2. traditional versus engineering
      3. morphology
   B. Properties of ceramics
      1. mechanical
      2. physical
      3. chemical
   C. Fabrication methods
      1. raw materials
      2. particle formation
         a. size
         b. shape
      3. compaction
      4. sintering
   D. Major application areas
      1. structural
      2. wear
      3. electrical
      4. magnetic
      5. refractory.

X. Production of Iron and Steel
   A. Extractive processes and ores
   B. Pig iron production
      1. raw materials
      2. blast furnace
   C. Steel production
      1. Bessemer converter
      2. open hearth furnace
      3. electrical furnace
      4. basic oxygen furnace
      5. ladle refining
      6. vacuum refining
   D. Primary metalworking
      1. cold working
      2. hot working
   E. Terminology.

COURSE OUTLINE - MATL 240 (continued)

XI. Alloy Systems and Equilibrium Diagrams
- A. Alloy
  1. definition
  2. binary alloy systems
  3. ternary alloy systems
- B. Types of alloys
  1. solid solution
     - a. interstitial
     - b. substitutional
  2. intermediate alloy compounds
  3. mixtures
- C. Equilibrium diagrams
  1. definition
  2. relationship of diagram to structure (equilibrium conditions of time and temperature)
  3. type of diagrams
     - a. solid solution alloys
     - b. eutectic and eutectoid alloys
     - c. partial solid solution alloys
     - d. inter-metallic compounds
     - e. insoluble alloys
- D. Solid state transformation
  1. allotropic
  2. diffusion
  3. re-crystallization
  4. grain growth
- E. Application of equilibrium diagrams
  1. establishment of heat treatment cycles
  2. relationship of structure with properties
     - a. face centered cubic lattice metals - ductile
     - b. body centered cubic lattice metals - hard and work harden to strengthen
     - c. hexagonal close packed lattice metals - susceptible to work hardening
     - d. strength from solid solutions
     - e. metallic compounds
     - f. grain size changes
     - g. distribution of strong or weak structures
     - h. composite structure dependent on amounts and strengths of component structures
     - i. grain boundaries strengthening or weakening influences
     - j. coring and segregation.

XII. Solid State Microstructure of Steel
- A. Pure iron
  1. allotropic changes
     - a. transformational points
     - b. crystal structures
- B. Iron - carbon systems
  1. steel
     - a. carbon ranges
     - b. crystal structures
       1. ferrite
       2. austenite
       3. delta

COURSE OUTLINE - MATL 240 (continued)

4. cementite - iron carbide
5. ledeburite
6. pearlite

c. transformational lines and points
1. eutectic
2. eutectoid
3. transformation line
4. grain size

d. carbon solubility
1. effect of temperature
2. effect of structure

e. metastable condition
f. hypo-eutectoid steel
g. hyper- eutectoid steel

2. wrought steels
3. cast irons
4. minor elements - trace elements.

XIII. Heat Treatments of Steel

A. Definition of heat treat
B. Principles involved
1. cycle
a. heating
b. holding
c. controlled cooling
2. carbon solubility changes with temperature
3. structures
4. volume changes

C. Full annealing
D. Process annealing
E. Normalizing
F. Spherodizing
G. Stress relief
H. harden - quench - temper
1. cycle
2. hardening
3. quenching
a. media
b. stages of liquid cooling
c. temperatures
d. structures formed
1. ferrite
2. pearlite
3. bainite
4. martensite
5.. retained austenite
e. effect of surface scale
f. effect of size - mass
4. time - temperature - transformation
5. hardenability of steel
a. carbon content

COURSE OUTLINE - MATL 240 (continued)

- b. alloy content
- c. grain size

I. Tempering
  1. reasons for tempering
  2. procedure cycle
     a. effect of temperature
     b. effect of time
  3. structures
     a. martensite
     b. tempered martensite
  4. properties - effect on

J. Austempering and martempering

K. Effect of alloying element

L. Heat treatment problems.

XIV. Surface Hardening

A. Reason for surface hardening

B. Methods
  1. carburizing
  2. nitriding
  3. cyaniding - carbo-nitriding
  4. induction hardening
  5. flame hardening

C. Depth of hardening

D. Limitations and applications.

XV. Classification and Selection of Low Alloy Steels

A. Method of classification
  1. method of manufacturing
  2. final use
  3. carbon content - low, medium, high
  4. special purpose - (leaded - free machining)
  5. chemical composition
     a. AISI SAE system
     b. unified (UNS)
  6. microstructure
  7. level of impurities
  8. trade name

B. Plain carbon and low alloy
  1. AISI-SAE systems of classification
  2. plain carbon steel
     a. effect of carbon on final usage
     b. applications
     c. typical mechanical properties
  3. low alloy steel
     a. purpose of adding alloying elements
     b. effects of alloying elements.

XVI. Tool Steel

A. Classification
  1. quenching media

COURSE OUTLINE - MATL 240 (continued)

2. major alloy content
3. application areas
4. trade names
5. AISI system
6. refining methods

B. AISI system
1. water quenching
2. shock resisting
3. cold work
4. hot work
5. high speed
6. mold
7. special purpose

C. Properties
1. hardening accuracy
2. toughness
3. wear resistance
4. red - hardness

D. Selection and application

E. Heat treatment

F. Common failure modes.

XVII. Corrosion

A. Nature of corrosion
1. electrochemical
   a. anode
   b. cathode
   c. electrolyte

B. Factors that affect corrosion
1. environment
2. material properties
3. physical conditions

C. Electromotive - galvanic series

D. Types of corrosion
1. uniform
2. pitting
3. crevice
4. galvanic
5. stress corrosion
6. inter-granular
7. de-alloying

E. Corrosion control
1. design
2. environmental
3. material.

XVIII. Stainless Steel

A. Classification
1. AISI
2. microstructure

B. Alloying elements

COURSE OUTLINE - MATL 240 (continued)

1. chromium
2. nickel
3. manganese

C. Grades
1. ferritic
2. austenitic
3. martensitic
4. duplex
5. maraging

D. Mechanical properties
1. typical
2. methods of increasing

E. Application areas.

XIX. Casting Processes

A. Definition of casting

B. Major processes
1. green sand
2. permanent mold
3. die casting
4. shell sand
5. investment - lost wax
6. lost foam
7. centrifugal

C. Quality factors

D. Casting limitations.

XX. Cast Irons

A. Types of cast iron
1. gray
2. white
3. chilled
4. malleable
5. nodular - ductile
6. high alloy

B. Microstructure and properties
1. excess carbon
   a. iron carbide
   b. graphite flakes - nodules
2. steel type matrix
   a. ferrite
   b. pearlite
   c. tempered martensite

C. Heat treatment cycles
1. annealing
2. normalizing
3. stress relief
4. heat quench and temper

D. Classification systems
1. casting process
2. minimum mechanical properties

COURSE OUTLINE - MATL 240 (continued)

E. Application areas
F. Typical properties.

XXI. Powder Metals
A. Definition
B. Manufacturing process
1. particle size and shape
2. blending - mixing
3. compacting
4. sintering
5. optional processing
C. Typical properties
D. Application areas.

XXII. Aluminum and Aluminum Alloys
A. Classification system
1. Aluminum Association
2. Unified Numbering System (UNS)
B. Wrought versus cast
C. Temper-work hardening
D. Major alloying elements
E. Precipitation hardening
F. Properties
G. Application Areas
H. Surface conditioning
1. anodizing
2. Alclad

XXIII. Copper and Copper Alloys
A. Classification system
1. C.D.A.
2. Unified Numbering System (UNS)
3. common names
B. Wrought versus cast
C. Temper - work hardening
D. Major alloying elements
E. Strengthening methods
F. Properties
G. Application areas.

XXIV. Other Nonferrous Alloys
A. Nickel
1. raw materials and manufacturing
2. properties
3. major alloying elements
4. application areas
B. Zinc
1. raw materials and manufacturing
2. properties
3. major alloying elements
4. application areas

COURSE OUTLINE - MATL 240 (continued)

C. Titanium
  1. raw materials and manufacturing
  2. properties
  3. major alloying elements
  4. application areas

D. Magnesium
  1. raw materials and manufacturing
  2. properties
  3. major alloying elements
  4. application areas

E. Refractory metals
  1. raw materials and manufacturing
  2. properties
  3. major alloying elements
  4. application areas.

XXV. Coatings

A. Reasons for coatings
  1. corrosion
  2. friction and wear
  3. to alter dimensions
  4. to alter physical properties

B. Types of coatings
  1. metallic
  2. non-metallic

C. Methods of coating
  1. electroplating
  2. immersion
  3. vacuum deposition
  4. oxide
  5. chemical vapor
  6. thermal spray

D. Application areas.

XXVI. Evaluation.

MINIMUM REQUIRED STUDENT LABORATORY ACTIVITIES DEFINED:

1. Basic Terminology

Define basic chemical terminology. List engineering materials and applications. Find atomic weights and atomic numbers for basic elements.

2. Physical Properties

Determine the density of various materials. Compare the thermal expansion, thermal conductivity, and magnetic properties of various metals.

3. Hardness Testing

Determine the hardness of various metals using the Rockwell, Brinell, and Shore hardness tests. Compare the results of the three methods.

COURSE OUTLINE - MATL 240 (continued)

4. Tensile Testing
   Conduct tensile tests of various metals. Determine the yield, tensile, and breaking strength, elongation and other properties.

5. Polymer Testing
   Test for density, specific gravity, tensile, impact, flexure, and thermal expansion.

6. Ceramic Testing
   Complete an in-laboratory exercise in finding apparent density, application areas, hardness, fabrication, coatings, and designing for stress.

7. Shear Impact and torsion
   Conduct shear impact and torsion tests of various metals. Determine the shear and impact strength and torsional properties of each metal.

8. Cooling Curves and Equilibrium Testing
   Investigate the cooling characteristics of various alloys of an alloy system. Construct the equilibrium diagram for the alloy system.

9. Heat Treatment
   Conduct various heat treatments on a typical steel. Conduct hardness and tensile tests and compare the results of the various heat treatments.

10 & 11. Micro Analysis
   Cut, mount polish, etch and draw microstructure from the heat treat samples.

12. Surface Hardening
   Incrementally surface harden a typical steel. Conduct hardness tests and investigate the effects of each increment of the surface hardening process.

13. Corrosion
   In-laboratory exercise in corrosion techniques and methods of corrosion prevention.

14. Selection of steels
   In-laboratory exercise in the selection of materials for various applications, using manuals, handbooks, catalogs, and other references.

CALCULUS USAGE

None.

ORAL AND WRITTEN COMMUNICATIONS REQUIREMENTS

Written laboratory reports.

COMPUTER USAGE

None.

APPENDIX A - 1996/97 CURRICULUM GUIDE SHEET

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CURRICULUM REQUIREMENTS
MECHANICAL ENGINEERING TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER 96\97

TECHNICAL	CREDIT HOURS
MECH 111 MET Seminar	1
MECH 122 Computer Appl. in Technology	2
MECH 211 Fluid Mechanics	4
MECH 212 Kinematics of Mechanisms	2
MECH 221 Mech. Measure. w/Comp. Appl.	4
MECH 222 Machine Design	4
MECH 223 Thermodynamics & Heat Transfer	3
MECH 240 Statics & Strengths of Materials	4
Technical Related	
EEET 215 Electronic Technology for MET 1	4
ETEC 140 Engineering Graphics	3
MFGT 150 Manufacturing Processes	2

GENERAL EDUCATION	CREDIT HOURS
Communication Competence	
ENGL 150 English 1	3
ENGL 250 English 2	3
Scientific Understanding	
PHYS 211 Introductory Physics 1	4
PHYS 212 Introductory Physics 2	4
Quantitative Skills	
MATH 116 Inter. Algebra/Num. Trigonometry	4
MATH 126 Algebra & Analytic Trigonometry	4
MATH 216 Applied Calculus	4
Cultural Enrichment	
Elective	3
Social Awareness	
Elective	3

A.A.S. Degree Minimum General Education Requirements in Semester Hours:

Cultural Enrichment Credits - 3
Communications Credits - 6
Social Awareness Credits - 3
Scientific Understanding Credits - 3-4

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APPENDIX A - 1996/97 CURRICULUM GUIDE SHEET

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

MECHANICAL ENGINEERING TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER 96\97
Curriculum Guide Sheet

NAME OF STUDENT ______________________ STUDENT I.D. ______________

Total semester hours required for graduation: 65

NOTE: Meeting the requirements for graduation indicated on this sheet is the responsibility of the student. Compliance with this agreement will assure the student completion of the program in the time frame indicated. Your advisor is available to asist you

FIRST YEAR - FALL SEMESTER			CREDITS	COMMENTS/GRADE	
MECH	111	MET Seminar	1		
MFGT	150	Manufacturing Processes	2		
ETEC	140	Engineering Graphics	3		
ENGL	150	English 1	3		
MATH	116	Intermediate Algebra/Numerical Trigonometry	4		
____	____	Cultural Enrichment/Social Awareness Elective	3		
FIRST YEAR - WINTER SEMESTER					
MECH	122	Computer Applications in Technology	2		
PHYS	211	Introductory Physics 1	4		
ENGL	250	English 2	3		
MATH	126	Algebra and Analytic Trigonometry	4		
____	____	Social Awareness/Cultural Enrichment Elective	3		
SECOND YEAR - FALL SEMESTER					
MECH	211	Fluid Mechanics	4		
PHYS	212	Introductory Physics II	4		
MECH	240	Statics and Strengths of Materials	4		
MATH	216	Applied Calculus	4		
SECOND YEAR - WINTER SEMESTER					
MECH	212	Kinematics of Mechanisms	2		
MECH	221	Mechanical Measurements w/Computer Applications	4		
MECH	222	Machine Design	4		
MECH	223	Thermodynamics and Heat Transfer	3		
EEET	215	Electronic Technology for MET	4		

NOTE: Students intending to complete a B.S. degree option are advised that they will also be required to take COMM 121 - Fundamentals of Public Speaking.

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APPENDIX B - CURRICULUM PROPOSAL

FERRIS STATE UNIVERSITY

COLLEGE OF TECHNOLOGY

MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

CURRICULUM PROPOSAL

MINOR CURRICULUM CLEANUP

MECHANICAL ENGINEERING TECHNOLOGY A.A.S. PROGRAM

March 28, 1996

APPENDIX B - CURRICULUM PROPOSAL

PROPOSAL SUMMARY FORM

Proposal Title: Mechanical Engineering Technology Curriculum Revision for ABET Accreditation

Initiating Department: Manufacturing Engineering Technologies **School:** Technology

I. Check appropriate category:

- ☐ New Major
- ☐ New Academic Minor
- ☒ Revision to Existing Major/Minor

II. Rationale or Justification for this proposal:

The purpose of the proposed curriculum revision is to meet ABET (Accreditation Board for Engineering and Technology) accreditation criteria.

III. Summary of all Curriculum Actions required:

Courses Added:
PHYS 212 Introductory Physics 2
MATH 216 Applied Calculus

Courses Deleted:
EEET 225 Electronic Technology for MET 2
MATL 240 Introduction to Material Science

Changes in Existing Courses (list both old and new

None

IV. List all surveys conducted with brief explanation of results:

Accreditation for the MET program has been endorsed at meetings of our industry advisory board (March, 1995 and March, 1996). It also has been endorsed in letters from alumni as well as from students.

V. Date(s) of Faculty Vote: March 11, 1996

VI. Date(s) of School Vote (if appropriate): N.A.

VII. Proposed Implementation Date: Fall 1996

24 5/89

Mechanical Engineering Technology

Accreditation Report

1996-1997

Section 5 of 5

APPENDIX B - CURRICULUM PROPOSAL

PROPOSAL FOR A MINOR CURRICULUM CLEANUP MECHANICAL ENGINEERING TECHNOLOGY PROGRAM

SUMMARY

This proposal is for a *Minor Curriculum Cleanup* for the Mechanical Engineering Technology (MET) A.A.S. Degree Program. A visit by a team of ABET Evaluators has been authorized for Fall Semester 1996. The rationale for this proposal is to meet minimum ABET requirements in the areas of physical sciences and mathematics. The proposal contains the following items:

- Rationale for the Course Additions and Removals
- Present Program of Study
- Revised Program
- Comparison of ABET Accrediting Criteria to the Mechanical Engineering Technology A.A.S. Program
- Mechanical Engineering Technology Program Enrollment and Retention Data
- Forms Required by the University Curriculum Committee.

RATIONALE FOR THE COURSE ADDITIONS AND REMOVALS

The proposed course additions and removals include the following:

Add: MATH 216 Applied Calculus (4 credits)
PHYS 212 Introductory Physics 2 (4 credits)

Remove: EEET 225 Electronics Technology for MET 2 (4 credits)
MATL 240 Introduction to Material Science (4 credits)

The following discussion addresses each change in turn:

1. ADDITION OF MATH 216 APPLIED CALCULUS (4 LEC, 0 LAB)

In the ABET Accrediting Criteria for A.A.S. Programs in Mechanical Engineering Technology there is a requirement for a course in applied calculus. The Mathematics Department offers this course and thus it is necessary for us to add MATH 216 Applied Calculus to our program.

This course is now required by the two B.S. programs our students most often ladder into: Manufacturing Engineering Technology and Product Design Engineering Technology.

Calculus, applied or "plain," has always stood as a serious challenge to the student. There is an advantage to the student of our offering MATH 216 in the third semester in consecutive order with MATH 116 and 126.

APPENDIX B - CURRICULUM PROPOSAL

PROPOSAL FOR A MINOR CURRICULUM CLEANUP
MECHANICAL ENGINEERING TECHNOLOGY PROGRAM

2. ADDITION OF PHYS 212 INTRODUCTORY PHYSICS 2 (3 LEC, 3 LAB)

ABET requires two physical sciences courses: A first course in physics and then either a second course in physics or a chemistry course. Our program presently contains the first physics course, PHYS 211 Introductory Physics 1. We are choosing to add PHYS 212 Introductory Physics 2 because it contains needed topics in electricity and magnetism. These topics prepare our students for further applications in electronics in EEET 215 Electronics for MET 1 and in MECH 221 Mechanical Measurements with computer Applications. Effectively, what is proposed is a substitution of the second physics course for one of the electronics courses.

3. REMOVAL OF EEET 225 ELECTRONICS TECHNOLOGY FOR MET 2 (3 LEC, 3 LAB)

To make way for the 8 semester credit hours added in mathematics and physics, a corresponding number of credit hours need to be removed. Since a course (PHYS 212) containing topics in electricity is being added, balance is achieved by removing the second electrical course, EEET 225 Electronics Technology for MET 2. Unfortunately, we do not receive credit for teaching certain topics in applied science when we have a College of Technology prefix. It is necessary in this instance to have a physical sciences course prefix.

4. REMOVAL OF MATL 240 INTRODUCTION TO MATERIAL SCIENCE (3 LEC, 3 LAB)

The question remaining is what other course can be removed. Because of general education requirements and because of the strictures imposed by chains of prerequisites, the candidate courses for removal are restricted to the following:

2nd Semester:	MATL Introduction to Material Science (3 + 3 = 4 credits)
3rd Semester:	MECH 212 Kinematics of Mechanisms (2 + 0 = 2 credits)
4th Semester:	MECH 221 Mechanical Measurements with Computer Applications (3 + 3 = 4) MECH 222 Machine Design (4 + 0 = 4 credits) MECH 223 Thermodynamics (3 + 0 = 3 credits)

Now MECH 221 and MECH 222 are the capstone courses for our MET program. They conclude our students' studies in experimental testing and in design and are essential to our role and mission.

While courses similar to MECH 212 and MECH 223 appear in the Product Design Engineering Technology program, these topics would be lost to students laddering in other directions. Also, these courses consist of only 2 and 3 credits, respectfully.

APPENDIX B - CURRICULUM PROPOSAL

PROPOSAL FOR A MINOR CURRICULUM CLEANUP
MECHANICAL ENGINEERING TECHNOLOGY PROGRAM

The material science course, however, would not be lost to students laddering into the Manufacturing or Product Design program. They will have room to take MATL 240 since they will have already received credit for MECH 240 Statics and Strength of Materials (4 credits) and MATH 216 (4 credits).

Material science topics are retained in the MET program by way of three courses:

MECH 240 Statics and Strength of Materials
MECH 221 Mechanical Measurements with Computer Applications
MECH 222 Machine Design

Another issue relates to the sequencing of courses:

Year	Present Sequence:	Proposed Sequence:
1	MATH 116 MATH 126 MATL 240	MATH 116 MATH 126
2	MECH 240	MATH 216 MECH 240
3	MATH 216	MATL 240

Traditionally, at Institutes of Technology, the sequence offered is

Statics and Strength of Materials
Material Science.

APPENDIX B - CURRICULUM PROPOSAL

MECHANICAL ENGINEERING TECHNOLOGY

PRESENT PROGRAM OF STUDY

FIRST YEAR - FALL SEMESTER		
MECH 111	MET Seminar	1 + 0 = 1
ETEC 140	Engineering Drawing & CAD	2 + 3 = 3
MFGT 150	Manufacturing Processes	1 + 3 = 2
MATH 116	Intermediate Algebra & Numerical Trigonometry	4 + 0 = 4
ENGL 150	English 1	3 + 0 = 3
	Cultural Enrichment/Social Awareness Elective	3 + 0 = 3
		14 + 6 = 16
FIRST YEAR - WINTER SEMESTER		
MECH 122	Computer Applications in Technology	2 + 0 = 2
MATL 240	Introduction to Material Science	3 + 3 = 4
MATH 126	Algebra & Analytic Trigonometry	4 + 0 = 4
PHYS 211	Introductory Physics 1	3 + 3 = 4
ENGL 250	English 2	3 + 0 = 3
		15 + 6 = 17
SECOND YEAR - FALL SEMESTER		
MECH 211	Fluid Mechanics	3 + 3 = 4
MECH 212	Kinematics of Mechanisms	2 + 0 = 2
MECH 240	Statics & Strength of Materials	4 + 0 = 4
EEET 215	Electronic Technology for MET 1	3 + 3 = 4
	Social Awareness/Cultural Enrichment Elective	3 + 0 = 3
		15 + 6 = 17
SECOND YEAR - WINTER SEMESTER		
MECH 221	Mechanical Measurements w/Computer Applications	3 + 3 = 4
MECH 222	Machine Design	4 + 0 = 4
MECH 223	Thermodynamics and Heat Power	3 + 0 = 3
EEET 225	Electronic Technology for MET 2	3 + 3 = 4
		13 + 6 = 15
	TOTALS:	57 + 24 = 65

TO BE ADDED FOR ABET ACCREDITATION		
MATH 216	Applied Calculus	3 + 0 = 3
and		
PHYS 212	Introductory Physics 2	3 + 3 = 4
or		
CHEM 114	Introduction to General Chemistry	3 + 2 = 4

APPENDIX B - CURRICULUM PROPOSAL

MECHANICAL ENGINEERING TECHNOLOGY

REVISED PROGRAM

FIRST YEAR - FALL SEMESTER			
MECH 111	MET Seminar	1 + 0 = 1	_____
ETEC 140	Engineering Drawing & CAD	2 + 3 = 3	_____
MFGT 150	Manufacturing Processes	1 + 3 = 2	_____
MATH 116	Intermediate Algebra & Numerical Trigonometry	4 + 0 = 4	_____
ENGL 150	English 1	3 + 0 = 3	_____
	Cultural Enrichment/Social Awareness Elective	3 + 0 = 3	_____
		14 + 6 = 16	
FIRST YEAR - WINTER SEMESTER			
MECH 122	Computer Applications in Technology	2 + 0 = 2	_____
MATH 126	Algebra & Analytic Trigonometry	4 + 0 = 4	_____
PHYS 211	Introductory Physics 1	3 + 3 = 4	_____
ENGL 250	English 2	3 + 0 = 3	_____
	Social Awareness/Cultural Enrichment Elective	3 + 0 = 3	_____
		15 + 3 = 16	
SECOND YEAR - FALL SEMESTER			
MECH 211	Fluid Mechanics	3 + 3 = 4	_____
MECH 240	Statics & Strength of Materials	4 + 0 = 4	_____
PHYS 212	Introductory Physics 2	3 + 3 = 4	_____
MATH 216	Applied Calculus	4 + 0 = 4	_____
		14 + 6 = 16	
SECOND YEAR - WINTER SEMESTER			
MECH 212	Kinematics of Mechanisms	2 + 0 = 2	_____
MECH 221	Mechanical Measurements w/Computer Applications	3 + 3 = 4	_____
MECH 222	Machine Design	4 + 0 = 4	_____
MECH 223	Thermodynamics and Heat Power	3 + 0 = 3	_____
EEET 215	Electronic Technology for MET 1	3 + 3 = 4	_____
		15 + 6 = 17	
	TOTALS:	58 + 21 = 65	

APPENDIX C - INDUSTRY ADVISORY COMMITTEE

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APPENDIX D - PROGRAM BUDGET

Mechanical Engineering Technology Program Budget Status (May 1996)
1995 - 1996 Actual and 1996 - 1997 Requested

Account	Allocation	Spent	Enc	Balance	Needed to End of Year	1996-1997 Requested
Supplies	1 157	1 349	0	-192	200	2 000
Travel	0	0	0	0	0	1 000
Contracts	1 109	737	372	0	100	500
Repair	84	84	0	0	0	25 000
Total	2 350	2 170	372	-192	300	28 500
Support Faculty	0	0	0	0	0	10 000
Faculty Development	0	0	0	0	0	1 500
Grand total	2 350	2 170	372	-192	300	40 000
Equipment Total	0	0	0	0	0	10 000

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

MECHANICAL ENGINEERING TECHNOLOGY
STORE ROOM INVENTORY
CREATED 1989 - 1990

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

INV.XLS

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.	
303A			1	OSCILLOSCOPE					1
303A			1	COMPUTER PORTABLE	9				1
303A		BOX	4	WIRE, ASSORTED					1
A1/1	1985		2	VISCOMETER SAYBOLT					1
A1/1	1985	1		VISCOMETER SAYBOLT BOX					1
A1/1			1	PIPETTE					1
A1/1			1	PIPETTE BULB					1
A1/2	1985		5	PLANIMETER, POLOR, COMP					1
A1/2		1		PENDULUM JOYSTICK	9				1
A1/2			9	THERMOMETERS - CELSIUS					1
A1/2			1	THERMOMETERS - FARHENHEIT					1
A1/2		1		METALS SCRAP					1
A1/2			1	SPECIFIC GRAVITY TESTER					1
A1/3	1985	1		METER FLOW					1
A1/3			12	DARTS					1
A1/3			3	STYROFOAM CUPS	15				1
A2/1	1985	1		MICROSCOPE FOR I.D. TUBES				18175	1
A2/1	1979	1		PNEUMATIC TRAINER					1
A2/2	1985		3	PRESSURE GAGES PX 242-10065V	11				1
A2/2	1985		1	PRESSURE GAGE PX 176-025A5V	11				1
A2/2	1985		2	PRESSURE GAGE PX 302-0506V	11				1
A2/2	1985		2	PRESSURE GAGE PX 300-1506V	11				1
A2/2	1985		2	PRESSURE GAGE PX 300-5006V	11				1
A2/2	1985		2	PRESSURE GAGE PX 300-5K6VV	11				1
A2/2	1985		5	THERMOCOUPLES	11				1
A2/2	1985	1		MULTIMETER, DIGITAL	11				1
A2/2	1985		1	PYSCHROMETER SLING	12				1
A2/3	1985		1	WATCH STOP	15				1
A2/3	1985	1		ORIFICE FLOW SPECIMENS					1
A2/3			2	GLASSES SAFETY	1				1
A2/3	1979	1		AIR VELOCITY GAGE DWYER	13				1
A2/3	1979	1		AIR VELOCITY CASE, DWYER	13				1
A1/3		1		micrometer measuring gage					
A1/3				Flow through an orifice specimen					

INV.XLS

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.	
A3/1	1985	1		FLOW THROUGH AN ORIFICE	21			45171	1
A3/1			1	TIRE, SPARE					0
A3/1	1979		25	THERMOMETER & TERMINAL TUBE					1
A3/1	1985	1		TESTER , DEAD WEIGHT PRESSURE	21			4172	1
A3/2	1989		4	CASES, ELECTRONIC BLUE	9				1
A3/2	1989		6	CLIPS BATTERY 9, VOLT	9				1
A3/2	1989		2	BATTERY, 9 VOLT	1				1
A3/2	1985		1	BUS STRIP, 8 POSITION	9				1
A3/2	1989		4	ELECTROLYTICS 4.7 @ 50v AXIAL	9				1
A3/2	1989		1	HOOD SHIELD 25 POS.	9				1
A3/2	1989		1	SUBMIN. FEMALE 25 POS.	9				1
A3/2	1989		2	D SUBMIN. MALE 25 POS.	9				1
A3/2	1989		2	SOCKETS PROFILE , 8 PIN	9				1
A3/2	1989		1	CAPACITOR 4.7MFD @ 35V AXIAL	9				1
A3/2	1989		3	RESISTOR, 10 OHM 1/4 WATT	10				1
A3/2	1989		1	RESISTOR, 10 OHM 1/2 WATT	10				1
A3/2	1985		1	THERMISTOR, NTC	5				1
A3/2	1985		2	PROTO BOARD W/TERMINALS	10				1
A3/2	1985		1	PROTO BOARD PLAIN	10				1
A3/2	1985		1	POWER MODULE, AC TO DC	11				1
A3/2	1985		2	AMPLIFIER, DC MILIVOLT	11				1
A3/2	1985		3	POWER SUPPLY	10				1
A3/2	1989		3	POTENTIOMETER	9				1
A3/2	1989		1	MAGNET	1				1
A3/3	1985		1	AIR VEL. & TEMP. METER					1
A3/3	1985		1	AIRFOIL FOR WINDTUNNEL	20				1
A3/3	1985		1	AIRFOIL ON POST	20				1
A3/3	1985		1	AIRFOIL NACA 4412	20				1
A3/3	1985		1	WIND TUNNEL DOOR	20				1
A3/3	1985		1	WT. FOR GOLF BALL DEMO	16				1
A3/3				8-1/2 IN.BRASS TUBES					1
A3/3		1		BALLOONS	1				1

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

INV.XLS

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.	
A3/3	1985	BOX	1	MANOMETER TUBES	13				1
A4/1	1985		1	JET IMPACT	21			45199	1
A4/1	1985		1	PLT TUBING VARIOUS DIA. & LEN.					1
A4/1	1979	1		VACUUM PUMP	7				1
A4/2		CAN	36	DEGREASER SPRAY	5				1
A4/2	1990	CAN	2	DEGREASER, MILD	5				1
A4/2		ROLL	3	TAPE, CELLOPHANE	3				1
A4/2		ROLL	2	WIRE, SOLDERING	5				1
A4/2			2	SOLDERING GUN ADJ.	5				1
A4/2			2	SOLDERING GUN NON ADJ.	5				1
A4/2			50 ft.	WIRE THERMOCOUPLE	5				1
A4/2			3	CANTILEVER TEST FIXTURE	4				1
A4/2			100 ft.	CABLE , 3 CONDUCTOR	5				1
A4/2		1		WIRE, SM GAGE THERMOCOUPLE	5				1
A4/2			1 PAIR	GLASSES, MAGNIFY					1
A4/2		1		SWABS, COTTON TIPS	6				1
A4/2		1		SPONGES, GAUZE	6				1
A4/2		1 oz. BTL	12	POLYURATHANE, M-COAT A	5				1
A4/2		1 oz.BTL	2	CATALYSTY, M-LINE	5				1
A4/2		1 oz. BTL	12	SOLVENT, ROSIN , M-LINE	5				1
A4/2		LGE	4	CONDITIONER A, M-PREP	5				1
A4/2		SM	10	CONDITIONER A, M-PREP	5				1
A4/2		LGE	5	NEUTRALIZER 5, M-LINE	5				1
A4/2		SM	10	NEUTRALIZER 5, M-LINE	5				1
A4/2		1		PICKS, TOOTH	1				1
A4/2	1990	1		M-FLUX SS KIT	5				1
A4/2	1990	1		M-FLUX AR KIT	5				1
A4/2	1990		1	TWEEZERS, SHARP	5				1
A4/2	1990		1	TWEEZERS, BLUNT	5				1
A4/2	1990		1	SCALE, STEEL 6-INCH	5				1
A4/2	1990		1	PROBE, DENTAL	5				1
A4/2	1990		1	SCALPEL W/BLADE	5				1

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.	
A4/2	1990		5	SCALPEL REPLACEMENT BLADE	5				1
A4/2	1990		1	EPOXY, PLASTIC	1				1
A4/2	1990		1	EPOXY, 5 MINUTE	1				1
A4/3	VARIOUS			EXPERIMENTS, STRAIN GAGE	8				1
A4/3	1989			EXPERIMENTS, FLOTATIONAL	8				1
A4/4	1985	1		MANOMETER CASE VINYL					1
A5/1	1985		1	VENTURI METER & WOOD CASE	21			45200	1
A5/1	1985		1	CP/CV APPARATUS					1
A5/1			1	PSI TRANSDUCER CAL. BOX	16				1
A5/2			13	STRAIN INDICATOR, PORTABLE	4			34958	1
A5/2			1	SB-10 SWITCH & BALANCE UNIT	5			45646	1
A5/2			1	STRAIN INDICATOR, DIGITAL	5			45646	0
A5/2			2	HANGER & WT. SET					1
A5/2			1	METRIC WT. SET 3g - 2kg					1
A5/2		1	MANY	TERMINALS, BONDABLE					1
A5/2			1	TACKLE BOX EMPTY	1				1
A5/2			175	STRAIN GAGES, 2-TERMINAL	5				1
A5/2			230	STRAIN GAGES, 6-TERMINAL	5				1
A5/2				STRAIN GAGES, ROSSETTE	5				1
A5/3		ROLL	6	SAND PAPER 320 GRIT	1				1
A5/3		ROLL	5	SAND PAPER 400 GRIT	1				1
A5/3			1	BLOCK, SANDING	1				1
A5/3			800	EAR PLUGS, DISPOSABLE	2				1
A5/3		ROLL	1	TAPE, MASKING	3				1
A5/3		BOX	1	PAPER, FILTER	1				1
A5/3		LGE SPL	1	STRING, BLACK	1				1
A5/3		SM SPL	1	THREAD, WHITE	1				1
A5/3		ROLL	4	SAND PAPER, 220 GRIT	1				1
B1/1		BOX	1	METAL PIECES, ASSORTED					1
B1/2				GLASSWARE, ASSORTED					1
B1/3			5	ELECTRIC MOTOR, 1/4 HP.					1
B1/3			1	ELECTRIC MOTOR, 1/5 HP					1

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.
B1/3			1	MOTOR MOUNT PLATE				1
B1/3			1	PULLEY, BELT 2" DIA.				1
B1/3			1	PULLEY, ADJ. 3-1/2 INCH				1
B1/3			1	BELT, 4L-340				0
B1/3			1	BELT, 4L-370				0
B1/3			1	BELT, 4L-360				0
B1/3			1	BELT, 5L-460				0
B1/3			1	BELT, 60-M34				0
B1/3			1	BELT, TIMING				0
B1/4				VAR. HYD., AIR HOSES & FITTINGS	14			1
B1/5			10	FUNNEL, PORCELIEN STRAINER	6			1
B1/5			1	FUNNEL, PLASTIC	1			1
B1/5			11	FLASKS, 60ml VOLUMETRIC, SAYBOLT	18			1
B1/5			14	BEAKER, 100ml	6			1
B1/5			4	FLASK, 100ml VOLUMETRIC	6			1
B1/5			2	BEAKER, 2000ml	6			1
B1/5			1	FLASK, 2000ml VOLUMETRIC	6			1
B1/5			1	BEAKER, 1000ml	6			1
B1/5			2	BEAKER, 250ml	6			1
B1/5			1	FLASK, 500mL VOLUMETRIC	6			1
B1/5			1	BOTTLE, SQUIRT, PLASTIC	6			1
B1/5			1	CYL GRADUATED, PLASTIC, 500ml	6			1
B1/5			1	FUNNEL GLASS, SHORT SPOUT	6			1
B1/5			1	FUNNEL GLASS, LONG SPOUT	6			1
B1/6			1	ACID NITRIC	6			1
B2/1			1	BOX PLEXIGLASS				1
B2/2		BTL	1	SPIRITS MINERAL	1			1
B2/2			1	CLEANER, BOARD CHALK	3			1
B2/2		BTL	1	CLEANER, PURPOSE ALL	3			1
B2/2		BTL	1	SOLUTION, SOAP	1			1
B2/3		BOX	1	SOAP BUBBLE EXP.	16			1
B2/3				PARTS, VARIOUS				1

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.	
B2/4			2	STICKS, METER	15				1
B2/5			1	HUMIDIFIER	15				1
B2/5			1	DRYER, CLOTHES PORTABLE					1
B2/5			1	LAMP, HEAT	1				1
B2/5			1	LAMP, MAGNIFYING	15				1
B3/1	1979	BOX	1	METAL PARTS, NUTS,BOLTS					1
B3/1		1	20 ft.	CHAIN	1				1
B3/1		BOX	1	PLATES, GLASS					1
B3/2	1972		1	PUMP, HYDRAULIC 1/5 hp.	14				1
B3/3	1979		1	LUBRICATOR, PNUEMATIC					1
B3/3	1985		1	VALVE, ELECTRIC 4 WAY					1
B3/3	1979		1	RESIVOIR , AIR, OIL					1
B3/3			2	CYLINDER, BORE 1-1/8"					1
B3/3			1	PISTON, DOUBLE "A"					1
B3/3	1979		1	VENTURI					1
B3/3	1979		1	PROBE GAUGING PROBE					1
B3/3	1979		1	BELLOWS, ROLLING ACTUATOR					1
B3/3	1979		1	DIAPHRAGM ACTUATOR					1
B3/3	1979		1	ORFICE, FLOW					1
B3/3	1972		1	VALVE HYD., MANUAL 3-WAY	14				1
B3/3	1972		1	CYLINDER, HYDRAULIC	14				1
B3/3	1979		1	CYLINDER, PNEUMATIC AIR	14				1
B3/3			1	MOTOR, ELECTRIC SMALL					1
B3/3			1	VALVE, MANUAL	14				1
B3/3	1979		1	VALVE EXHAUST QUICK					1
B3/3	1985		1	VALVE SOLONOID	14				1
B3/3	1979		1	BEARING AIR					1
B3/4	1979		3	GAGE, VACUUM 0-30 in. OF HG					1
B3/4	1985		1	GAGE, ELECTRIC RPM 0-10,000					1
B3/4	1985		4	GAGE, PRESSURE 0-30 PSIG	11				0
B3/4	1985		3	GAGE, PRESSURE 0-15 PSIG	11				0
B3/4	1985		2	GAGE PRESSURE 0-60 PSIG	11				0

INV.XLS

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.
B3/4	1985		4	GAGE PRESSURE 0-100 PSIG	11			0
B3/4	1985		2	GAGE PRESSURE 0-160 PSIG	11			0
B3/4	1985		1	GAGE PRESSURE 0-50,000	11			1
B3/4	1985		1	GAGE PRESSURE 0-2844	11			1
B3/4	1985		1	GAGE PRESSURE 0-6000	11			1
B3/4	1985		2	GAGE PRESSURE DIFF. 0-20				1
B3/5		1		WEIGHTS, VARIOUS				1
B3/5		BOX	1	PROTO DRAFT	19			1
B3/5			1	ANGLE FRAME FOR DRAFTING	19			1
B3/6			1	PAN, CAKE 13"x9"	1			1
B4/2		BOX	1	CLAMPS VARIOUS SIZES	1			1
B4/2		BOX	1	BANDS, HOSE GRIP TIGHT 1/4"	1			1
B4/2		BOX	1	CLAMPS, HOSE	1			1
B4/2		BOX	1	SCREWS, CAP 5/16"x 3/4"	1			1
B4/2		BOX	1	NUT, THREAD COURSE 5/16"	1			1
B4/2		BOX	2	NUTS, VARIOUSE SIZES	1			1
B4/2		BOX	2	WASHERS, VARIOUS SIZES	1			1
B4/2		BOX	2	WASHERS LOCK, VARIOUS SIZES	1			1
B4/2		BAG	5	NUTS AND BOLTS, SCREW HEAD	1			1
B4/2		CUP	1	SCREWS, VARIOUS SIZES	1			1
B4/2		KIT	1	HANDLE DRAWÈR, W/MOUNTING	1			1
B4/2		BOX	1	MOUNTING'S ANGLE	1			1
B4/2		BOX	1	TABS, MOUNTING SHELF	1			1
B4/2		BOX	1	BRADS 1/4"	1			1
B4/2		BOX	1	NAILS FINISH, 4D 1-1/8"	1			1
B4/2		BOX	1	NAILS FINISH, 6D-2"	1			1
B4/2		BOX	1	BOLTS, U	1			1
B4/2	1985		1	SWICTH, ELECTRIC CAM ACTIVATED				1
B4/2		BOX	1	CONNECTORS, PIPE VARIOUS	1			1
B4/2		BOX	1	ELBOWS, PIPE VARIOUS SIZES	1			1
B4/2			7	COUPLER BODY STYLE M	1			1
B4/2	1990		14	COUPLER BODY STYLE A	1	4.19		1

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.
√B4/2	1990		12	BARBS, HOSE 1/4"	1	0.79		1
√B4/2	1990		12	REDUCER, 1/4" TO 1/8"	1			1
√B4/2			20	FEMALE COUPLER PLUG 1/4" STYLE A	1			1
? B4/2	1990		6	MALE COUPLER PLUG 1/4" STYLE A	1			1
? B4/2	1990		14	BARBS, HOSE MALE 1/4"	1			1
? B4/2	1990		100 ft.	HOSE, AIR 1/4"	1			1
√B4/3	1979		1	GAGE FILTER AIR LUBRICATOR ASSEM.				1
B4/3	1979	SM	4	VALVES, FLOW CONTROL				1
B4/3	1979	LGE	2	VALVE, FLOW CONTROL				1
B4/3	1979		1	VALVE, CHECK				1
B4/3	1979		2	MUFFLER				1
B4/3	1979		1	REGULATOR				1
B4/3	1979		2	SWITCH PRESSURE ADJ.				1
√B4/3	1985		2	ADJ. PRESSURE FLOW BOX (HYD)	14			1
B4/3	1979			EXTRA AIR MALE CONNECTORS	1			1
B4/3	1979		1	SELECTOR, AIR				1
B4/3	1979		1	CUMULATOR ACTING REVERSE				1
B4/3	1979		1	COMPARATOR				1
B4/3	1979		1	CORE, FILTER				1
B4/3	1979		1	VALVE				1
B4/3	1979		1	VALVE, AIR CAM OPERATED				1
B4/3	1979		3	DIRECTORS FLOW AIR				1
B4/3	1979		1	DIRECTOR AIR FLOW ELECTRIC				1
B4/3	1979		1	GAGE PSI DIAPHRAGM OPERATED				1
B4/4			9	VALVES, PALM				1
√B4/4	1979		1	METER, FLOW SERIES 30				1
B4/4	1979		1	STRAINER, FLOW				1
B4/4	1985		2	VALVE, ELECTRIC AIR PILOT				1
B4/4			2	VALVE, DYNA COIL SOLONOID				1
√B4/4	1979		2	METER, FLOW				1
?B4/4		BOX	1	VARIOUS NUTS, BOLTS,U-BOLTS	1			1
√B4/5			3	RODS CONNECTING, VARIOUS SIZES				0

INV.XLS

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.	
B4/6			1	ANTIFREEZE	15				1
B4/6			1	WATER, DISTILLED PURIFIED	6				1
B5/1	1985	1		PUMP, FLUID					1
B5/1	1985	1		METER, FLOW RATEMASTER	13				1
B5/1	1972		2	GAGE PRESSURE, HYD.	14				1
B5/1			1	CASE, FOAM					1
B5/2	1972		1	PHOTOCELL & LIGHT SOURCE	14				1
B5/2	1972			WIRE FOR FLUID EXP.	14				1
B5/2	1972		1	RELAY, TIME DELAY	14				1
B5/3	1972		2	FLUIDICS FLIP FLOP	14				0
B5/3	1972			HOSE CONN. FOR FLUIDICS	14				1
B5/3	1972		2	FLUIDICS, PUSH BUTTON	14				1
B5/4			1	SWITCH, MICRO	14				1
B5/4	1985	BALL	3	EXPERIMENT, GOLF BALL	16				1
B5/4		1		KIT, MOUNTING HICKOK BENCH	14				1
B5/5	1979		1	DIAGRAM, TECUMSEH FLOAT FEED	17				1
B5/5	1979		1	DIAGRAM, TECUMSEH DIAPHRAGM	17				1
B5/6		SM	1	WATER DISTILLED	6				1
B5/6		LGE	1	WATER, DISTILLED	6				1
B5/6		LGE	2	CONTAINER, EMPTY					1
B5/6		SM	1	CONTAINER, EMPTY					1
C1/3			1	INDICATOR LOAD	28				1
C1/3		BOX	1	THERMOCOUPLE MATERIAL	11			45170	1
C1/3			1	WHEATSTONE BRIDGE	29			34885	1
C1/3			2	INDICATOR, POTENTIOMETER	30				1
C1/4			4	INTERFACE BOX TRS-80	9				1
C1/4			1	THERMOMETER, DIGITAL	32			45223	0
C1/5			1	TACHOMETER	33				1
C1/5			1	EXPANSION BOARD	9				1
C1/5			6	INTERFACE SENSORBUS	34				1
C1/5			3	AMP THERMOCOUPLE	35			45770-1	1
C1/5			1	PLOTTER	36			57028	1

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

LOC	DATE ACQ	UNIT	QTY	DESCRIPTION	VENDOR	UNIT $	COST	FERRIS I.D.	
C1/8	1970		11	BURNERS BUNSEN					1
C1/8	1970		13	STANDS BUNSEN					1
C3/8	1972		1	UNIT, FLUID FLOW				22397	1
C4/2	1985		1	POLARISCOPE				45206	1
C4/3			1	SLANT MANOMETER					1
C5/1			2	STRESS COAT ANALYSIS					1
C5/6				WIRE, ASSORTED					1
CABIN	1985		1	VISCOMETER CAPILLARY TUBE	21			45173	1
LAB	1985		20	MANOMETER (METRIC)	13				1
LAB	1985		2	MANOMETER (INCHES)	13				1
LAB	1985		1	WIND TUNNEL	20	14771	####	45384	1
LAB			1	WIND TUNNEL, PORTABLE	22			34956	1
LAB	1985		1	SCALE	23			MISSING	1
LAB	1985		1	FLUID MECHANICS TRAINER	21			45205	1
LAB	1972		1	HYDRAULIC TRAINER	14			35140	1
LAB	1985		2	STARBUCK DIGITAL TO ANALOG	24			MISSING	1
LAB	1985		85	HYDRAULIC PARTS, MISC.	14				1
LAB				PIPET AND GLASS TUBES, VAR.					1
LAB				GAGES, RPM AND PSI., VAR.					0
LAB	1962		1	OSCILLOGRAPH, RECORDING					1
LAB	1985		1	FREEZER, LO-COLD	25				1
LAB			1	COMPRESSOR, AIR 1/3hp	26			44548	1
LAB			1	COMPRESSOR, AIR 1/8hp					1
LAB			1	MOTOR ELECTRIC, POWER TEC	27			35285	1
LAB				EQUIPMENT, OLD (ON SHELF)					0

C3/1

1 steering gear
2 angle signal
2 Potentio meter
1 cord with microphone jack
1 6 prong cord
1 standardizing Rheostat
part of a pulley
1 Amperes

CODE	VENDORS NAME AND ADDRESS
1	HARDWARE STORE
2	BILSOM INC 11800 SUNRISE VALLEY, RESTON, VA, 22091
3	CAD DEPARTMENT SUPPLY, FSU
4	VISHAY, PO BOX 456, ROMULUS, MI 48174
5	MEASUREMENTS GROUP INC, PO BOX 27777, RALIEGH, NC 27611,ATTN MR. LINEBACK
6	SCIENCE STORES, FSU
7	FISHER SCIENTIFIC
8	PROJECTS, OLD
9	RADIO SHACK
10	ELECTRONICS DEPARTMENT, FSU
11	OMEGA ENG INC, ONE OMEGA DR BOX 4047, STAMFORD, CT 06907-0047
12	TAYLOR INSTRUMENTS SYBORN CORP, ARDEN, NC 28704
13	DWYER INSTRUMENTS, MICHIGAN CITY, IN 46360
14	HICKOK TEACHING SYSTEMS INC, WOBURN, MASSACHUSETTS 01801
15	GENERAL
16	FABRICATED IN MET LAB
17	TECUMSEH PRODUCTS
18	CORNING GLASS WORKS, CORNING, NEW YORK 14830
19	SOUTH WESTERN PUBLISHING CO
20	DELTA LAB, 38340 VOREPPE, FRANCE
21	TEC QUIPMENT LTD, NOTTINGHAM, ENGLAND, ATTN ANDREW SPENSER
22	SCOTT ENGINEERING SCIENCES, POMPANN BEACH, FL 33060
23	OHAUS SCALE CORP, FLORHAM PARK, NJ
24	STARBUCK DATA CO, PO BOX 24 NEWTON LOWER FALLS, MASSACHUSETTS 02162
25	SCIENTIFIC CORP, ADRIAN, MI
26	GAST, BENTON HARBOR, MI
27	VEGA ENTERPRISES, DECATUR, ILLINOIS (DEFUNCT)
28	GSE, DETROIT MI 481219
29	BECKMAN INSTRUMENTS INC CEDAR GROVE, NJ
30	LEEDS & NORTHRUF CO, PHILADELPHIA, PA
31	TYCHON INC
32	CASPER INTEGRATED SYSTEMS
33	TECHNICAL OIL TOOL CORP 1057 N LA BRES AVE, LOS ANGELAS, CA

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

34	ICSENSORS, 1701 McCARTHY BLVD MILPITUS CA 95035 (408) 432-1800
35	LAWSON LAB INC
36	HEWLETT PACKARD

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

CIM PROJECT
EQUIPMENT AND SUPPLIES FOR PROTOTYPE TESTING

VENDOR: MEASUREMENTS GROUP, INC.
P.O. BOX 27777 PHONE: (919)365-3800
RALEIGH, NC 27611 FAX: (919)365-3945

QTY	UNIT	DESCRIPTION	UNIT PRIC	AMOUNT
5	Box of 10	Strain Gage EA-06-060LZ-120 (Student Gage)	$10.00	$50.00
5	Box of 10	Strain Gage Rosette (45 degree) EA-06-060RZ-120 (Student Gage)	$25.00	$125.00
5	Box of 10	Strain Gage EA-13-060LZ-120 (Student Gage)	$10.00	$50.00
5	Box of 10	Strain Gage Rosette (45 degree) EA-13-060RZ-120 (Student Gage)	$25.00	$125.00
5	Box of 5	Small 2-Element 90 degree Torque Strain Gag EA-06-090TW-120	$52.00	$260.00
5	Box of 5	Small 2-Element 90 degree Torque Strain Gag EA-13-090TW-120	$52.00	$260.00
1	Unit	P-3500/Option LED Portable Strain Indicator	$1,290.00	$1,290.00
1	Unit	Model P-3500-A50 Transducer Input Connect	$20.00	$20.00
1	Unit	Model P-3500-A28 Line Voltage Adapter 115	$25.00	$25.00
1	Unit	SB-10 Switch & Balance Unit	$1,215.00	$1,215.00
1	Unit	Model 1550A Strain Indicator Calibrator	$1,675.00	$1,675.00
1	Unit	Model 1300 Gage Installation Tester	$895.00	$895.00
2	Kit	GAK-2-200 Strain Gage Application Kit	$200.00	$400.00
1	Kit	ATS-2 Gage Application Tool Set	$225.00	$225.00
2	12 oz can	CSM-1 Degreaser	$9.00	$18.00
4	Pkg of 200	GSP-1 Gauze Sponges	$7.75	$31.00
4	Pkg of 100	CSP-1 Cotton Swabs	$2.75	$11.00
1	16 oz bottl	MCA-2 M-PREP Conditioner A	$8.25	$8.25

APPENDIX E - INVENTORY OF MET LABORATORY EQUIPMENT AND SUPPLIES

1	16 oz bottl	MN5A-2 M-PREP Neutralizer 5A	$8.25	$8.25
1	Quart	RSK-2 Rosin Solvent	$36.50	$36.50
4	roll	PCT-2A Cellophane Tape 3/4 inch X 108 ft	$6.60	$26.40
1	12 1-oz btl	FAR-1 M-FLUX AR Kit	$27.50	$27.50
2	1 lb roll	361-20R 0.020 inch Dia. Cored Solder Tin-Lead-Antimony	$25.50	$51.00
1	500 ft roll	134-AWP Solid Copper Wire, Polyurethane En	$11.00	$11.00
1	1000 ft roll	339-DFV Stranded Tinned Copper Wire, Flat,	$265.00	$265.00
2	Kit	M-BOND 200 Adhesive	$30.00	$60.00
1	Kit	M-BOND AE-10 Adhesive	$60.00	$60.00
1	Unit	Model 2000 A/D CONVERTER MODULE, incl 15 ft GPIB interface cable and Application Software	$2,350.00	$2,350.00
1	Unit	Model 2000-A66 AT-GPIB/TNT Board (National Instruments AT-GPIB/TNT)	$575.00	$575.00
1	Unit	Model 2110A POWER SUPPLY	$685.00	$685.00
2	Unit	2120A STRAIN GAGE CONDITIONER/AMPLI 2 channels with bridge completion & amplification	$1,075.00	$2,150.00
1	Unit	Model 2131 Digital Readout w/Peak Hold/Rete	$935.00	$935.00
1	Unit	Model 2150 RACK ADAPTER (19 inch) Accepts up to 6 modules	$590.00	$590.00
1	Unit	Model 2155 PORTABLE TEN CHANNEL ENC Houses complete 2100 system	$325.00	$325.00
2	Unit	Model 2120-A48 BLANK FRONT PANEL	$15.00	$30.00
			TOTAL:	$14,868.90

APPENDIX F - COMPUTER FACILITIES OF THE COLLEGE OF TECHNOLOGY

College of Technology Computer Facilities

Department or Area	Computer Labs	Number of Computers	Platforms
Mfg Eng Tech	8	192	IBM/UNIX
Construction	5	143	IBM
Auto/Heavy Equipment	2	125	IBM/AS400
Electrical	6	83	IBM/UNIX
Graphics	3	59	IBM
Dean's Office	0	13	IBM
TTC	1	16	
Totals	**25**	**631**	

APPENDIX G -UNIT ACTION PLANS

Manufacturing Engineering Technologies Department Fiscal Year 1996

Program: Mechanical Engineering Technology

Date: November 30, 1995

Prepared by: George R. Olsson, Ph.D.

GOAL 1. **To Assess Student Outcomes**

The Program will accomplish a student outcomes assessment plan in coordination with the University Student Outcomes Assessment Committee.

MAJOR ACTIVITIES AND PROCESSES:

- The program will develop assessment tools that will be administered to measure knowledge and skills acquired by students by Fall 1996.
- Student performance in entry-level courses and in capstone courses will be monitored. Results will be integrated into a system of feedback to the Department and to Academic Affairs by Winter 1997.

EXPECTED OUTCOMES:

- The program will have analyzed entering students' success rate in initial courses and tracked students' subsequent success in program courses by Winter 1997.
- The program will have implemented an outcomes assessment by Winter 1997.

INDICATORS/SOURCES:

- The development of an effective feedback system on student performance and outcomes.
- The use of feedback from student performance analysis to set expectations for student success and design improvement strategies.

REPORTING PROCESSES:

- Reports submitted to: Department Head, Dean, Academic Senate.

RESOURCE REQUIREMENTS:

- Allocation of resources to support faculty in the development of student assessment tools in the form of release time and or Summer contracts ($ 12 000).

APPENDIX G -UNIT ACTION PLANS

Manufacturing Engineering Technologies Department Fiscal Year 1996

Program: Mechanical Engineering Technology

Date: November 30, 1995

Prepared by: George R. Olsson, Ph.D.

GOAL 2. **ABET Accreditation**

Seek Accreditation Board for Engineering and Technology (ABET) approval for the Associate of Applied Science degree in Mechanical Engineering Technology.

MAJOR ACTIVITIES AND PROCESSES:

- Seek administrative support for the accreditation effort.
- Obtain information on procedures from the Electrical/Electronics department (who recently received ABET accreditation).
- Gather syllabuses, exams, handouts, and student papers from each course.
- Arrange for visitation by ABET accreditation specialist/consultant.
- Complete accreditation procedures, including curriculum revisions, as necessary, documentation, and visitations.

EXPECTED OUTCOMES:

- ABET accreditation will help draw students to the MET program and to Ferris.
- All graduates with an associate degree in mechanical engineering technology qualify automatically as a certified technician.
- The MET student organization will be affiliated as a student chapter with the American Society of Mechanical Engineers.
- Program graduates will achieve enhanced career opportunities.

INDICATORS/SOURCES:

- ABET will have certified the associate degree in mechanical engineering technology.

REPORTING PROCESSES:

- Interaction among faculty, administrators, and ABET representatives.

RESOURCE REQUIREMENTS:

- Consulting fees, ABET visitation costs, report preparation ($ 8 500).

APPENDIX H - 1986 NCA ACCREDITATION REVIEW SELF-STUDY SURVEY

I. THE ROLE AND MISSION OF THE MECHANICAL ENGINEERING TECHNOLOGY (MET) PROGRAM

A. The Goals and Objectives of the MET Program.

1. Educational Goals.

At Ferris the MET students learn to make graphic drawings; apply mathematical and physical principles to the solution of technological problems; design mechanical components and machines; perform engineering tests for such quantities as stress, strain, torque and temperature; apply principles of fluid mechanics, fluid power and thermodynamics; specify material selection and processing; collect test data; and prepare technical reports. Students acquire written and verbal communication skills through the study of English, humanities and behavioral sciences courses.

2. Occupational Skill Levels of MET Graduates.

An MET graduate can assist in developing and testing new machinery and equipment, review product instructions and drawings for specifications, operate test equipment, gather test data and prepare engineering charts and graphs.

3. Service to the Community, State and Nation.

The MET program provides service to the larger community by adding to the pool of trained technicians and designers that can meet the present and future challenges of advancing technologies.

B. Compatibility of the MET Program with the Ferris State College[1] (FSC) Mission and Role Statement.

The MET program supports the FSC mission and role in many ways:

- MET is a career-oriented program blending technical and liberal arts studies for a balanced education which provides for future career flexibility.
- The MET program supports an "open-door" admissions policy which allows most prospective students to achieve a college education.
- The MET program supports the "laddering" concept which gives our graduates the flexibility to move beyond their initial educational aspirations and move on to baccalaureate and professional programs.
- The MET program cooperates with Community Colleges by providing transfer opportunities and can grant academic credit for life experiences.

C. Integration and Coordination of the MET Program with other Programs at FSC.

1. Relationship with Similar Programs.

The MET program is located administratively in the Industrial Department,[2] School of Technology.[3] The MET course offerings in statics and strength of materials, metallurgy, fluid power and kinematics are

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1 Ferris State College has become Ferris State University.

2 The Industrial Department has been renamed the Manufacturing Engineering Technologies Department.

made available to and support the other departmental engineering technology programs in Plastics, Technical Drafting, Welding, Manufacturing and Electrical/Electronics.

2. Sharing of Faculty and Facilities with other Programs.

The MET faculty and facilities provide full support of the MET course offerings for students in parallel technology programs in the Industrial Department. The facilities of the MET laboratories at FSC include equipment for metallurgical and strength of materials testing, for fluid mechanics investigations, for fluid power circuit and control system operation, and for electronic and computer-controlled experimental testing.

3. Serving the FSC Campus Spectrum.

The faculty and facilities of the MET program have been made available to support technical workshops and seminars sponsored by the Gerholz Institute for Lifelong Learning (GILL) and have been used to support technical development projects at the Manufacturing Resources and Productivity Center[4] (MRPC).

4. Integration with Programs outside the School of Technology/Industrial Department Structure.

After completing a two-year associate degree program, the MET graduate is prepared to exercise a choice from a number of educational options leading to baccalaureate degrees. These choices include enrolling in third and fourth year programs in Manufacturing Engineering Technology (School of Technology), Production Management (School of Business), Vocational-Technical Teacher Education (School of Education) and Applied Mathematics (School of Arts and Sciences).[5]

D. **Coordination of the MET Program with Programs at other Institutions.**

1. Participation in Cooperative Efforts with other Institutions.

The MET program has not participated in cooperative efforts with other institutions.

2. Promotion of Articulation with other Institutions.

The MET program accepts transfer students from other institutions, primarily community colleges.

3. Promotion of Laddering into and out of FSC.

MET graduates may elect to pursue third and fourth year programs leading to a baccalaureate degree in MET at several institutions, including Wayne State University and Lake Superior State College. Various other third and fourth year programs are available to MET graduates at many Michigan universities.

E. **Service to the State of Michigan.**

1. Geographical Spread of similar Programs.

FSC's two-year career-oriented programs such as MET are unique in the west-central area of Michigan along the Grand Rapids-Traverse City axis. FSC also provides community college services in this area and the MET program melds well with that role.

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3 The School of Technology has become the College of Technology.
4 The MRPC has been renamed the Technology Transfer Center (TTC).
5 These Schools all have been renamed Colleges.

2. Utility of the Geographical Location of the MET Program at FSC.

FSC is centrally located in west-central Michigan.

3. Employment needs in Michigan for MET Graduates.

MET graduates fill the gap between craftsmen and industrialists on the one hand and scientists and engineers on the other. They play an important role in engineering laboratory testing and in product design and development in automotive and other important Michigan industries.

4. Promotion of Economic Welfare in Michigan by the MET Program.

A highly trained technical work force is one of Michigan's most important resources. MET graduates fill an important niche in the State in the areas of mechanical design and testing.

5. The MET Program as an Information Resource for the State of Michigan.

The MET faculty have been active in and supportive of related professional and technical societies. In 1981 the MET faculty organized, sponsored and hosted at FSC the annual meeting of the Michigan Teachers of Mechanics. Through GILL and MRPC seminars and projects, the MET program maintains contact and promotes interchange of information with industry.

II. THE RESOURCE NEEDS OF THE MECHANICAL ENGINEERING TECHNOLOGY PROGRAM

A. The Human Resources of the MET Program.

1. Faculty Resources.

The faculty of the MET program are sufficient in number and have appropriate academic credentials and non-teaching related work experience.

The full-time MET faculty include:

David H. Anderson	BS Met Eng, Michigan state University
Kimberly H. Gillett	BSME, Michigan Technological University M Eng, Pennsylvania State University
Hiram F. Herrick	BS, Michigan State University BS, Arizona State University MS, Air Force Institute of Technology Registered PE
Charles A. Matrosic	BS, MS, Michigan Technological University Registered PE
George R. Olsson	BS Eng Sci, Case Institute of Technology MS Physics, Drexel Institute of Technology PhD Aero, University of Michigan

Only occasional use is made of adjunct faculty in the MET program. This usually involves covering an extra section of an elementary drawing course.

The MET faculty regularly attend professional meetings and seminars outside the college in their respective fields. These professional development activities are seldom supported through the MET program and Industrial Department budgets.

2. Support Personnel.

The Machine Tool Technician occasionally gives support to the MET program.

3. Student Assistants.

One student assistant is employed each quarter six hours per week to support the laboratory activities.

4. MET Advisory Committee.[6]

The MET Advisory Committee is presently being reconstituted. It has not been active for several years.

5. Professional Consultants.

Professional consultants have not been used by the MET program.[7]

6. Needs for Additional Personnel.

Presently, there are insufficient personnel available to meet the needs of the program. Due to rapid growth in related programs in Plastics and Welding Engineering Technology, there is an increasing demand for offerings of our courses in the areas of metallurgy, statics and strength of materials, fluid power, and kinematics. Thus, additional MET faculty are required if these demands are to be met.

The need for additional MET faculty can be established through a forecast of enrollments in the related programs noted above.

In addition, there is little time allocated for course and curriculum development and for professional development, particularly in the area of computer aided design (CAD), where the School of Technology has acquired a major facility.

B. **The Financial Resources of the MET Program.**

1. The Annual Budget Allocation for the MET Program.

- Salaries: $ 150 000
- CSSM:[8] 2 890

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6 Industrial Advisory Committee.

7 In 1984 an ABET-Accreditation consultant was brought in to review the Manufacturing Engineering Technology program. He also reviewed the associate degree laddering programs, including MET.

8 CSSM represents a catch-all category including materials and supplies, communication, duplicating costs, and miscellaneous.

- Equipment: 10 000 (Voc-Ed Grant)
- Student Wages: 600

2. Approximate Student Credit Hour Cost (FSC Formula)

According to the FSC cost accounting formula, the cost per student credit hour in the MET program is approximately $ 88.00.

3. Impact of Gifts, Grants and Earned Revenue.

The Federal Vocational Education Grants received in the last two years have had a major impact on the MET laboratories. The funding has amounted to over $ 60 000 in this period and has represented the only source for capital equipment acquisition available.

A small amount of funding has been received in the form of gifts (equipment as well as dollars) and of earned income from Summer seminars.

There exist possibilities for significant expansion of earned income through offerings of seminars and short courses for industrial clients. Also, a reconstituted Advisory Board for the MET program can offer significant aid in a corporate gift program.

4. Additional Budget Needs of the MET Program.

Additional budget needs of the MET program fall into several categories: (1) An increase in the salary allocation is required to permit faculty additions to cover the increasing demands for MET courses by related programs; (2) an increase in CSSM funding is needed to cover needed increases in expenditures for laboratory operation and for professional development; (3) capital equipment expenditures should become a regular part of the allocation; and (4) funds should be allocated for a second student laboratory assistant.

C. **Physical Resources of the MET Program.**

1. Available Space.

The MET program does not have adequate space to meet its needs. Also, there is a problem in that laboratory space is used as classrooms for non-MET courses. Some MET faculty office space is rather cramped and is not suitable as an academic environment.

2. Determination of Space Needs of the MET Program.

The space requirements of the MET program need to be reviewed. Space allocation decisions are made at the School of Technology and Office of Academic Affairs level.

3. Adequacy of Equipment.

New equipment for the MET laboratories has been added in the last two years as a result of Federal Vocational Education grants. However, there still exists outdated and non-repairable laboratory items that need replacing. Additional new equipment is also needed to provide sufficient replications of setups.

APPENDIX H - 1986 NCA ACCREDITATION REVIEW SELF-STUDY SURVEY

4. Determination of Equipment Needs.

Equipment needs have been determined on the basis of available funding from Federal grants. Approval of requests is made at the departmental, School of Technology level and College level. Virtually no other FSC capital equipment funding has been received by the MET program in the last seventeen years.

III. EFFECTIVENESS OF THE MECHANICAL ENGINEERING TECHNOLOGY PROGRAM.

A. Demonstration of the Quality and Effectiveness of the MET Program.

1. MET Program Accreditation.

The MET program at FSC is accredited by the North Central Association of Colleges and Schools (NCA).

The types of accreditation available to the MET program include:

- Accreditation Board for Engineering and Technology (ABET)
- Society of Manufacturing Engineers (SME)

Up to now ABET accreditation has not been sought, primarily because of administrative cost considerations and program changes.

A preliminary evaluation for ABET accreditation of the Manufacturing Engineering Technology program (MfgET) and its feeder programs (including MET) was performed by an outside consultant. A comment was that all the feeder programs would need a calculus (or technical calculus) math sequence.

No comments were made concerning the MET program in the last NCA evaluation (1977).

The NCA will again visit FSC in 1987 for its periodic evaluation.

2. Steps taken to Promote Quality in MET Courses.

Current and complete syllabi are available for courses.

A standard format is available which includes a course description, a topical outline, grading structure, and learning activities.

Standardization of courses is maintained by use of standardized course outlines and syllabi and uniform use of the same texts.

Texts and manuals are selected by the group of faculty that usually teach the course and approved by the department head.

The course review process proceeds in the following way. As new information becomes available, the MET faculty holds meetings to discuss and recommend proposed changes in a course offering. Related courses used in other programs require wider coordination on changes. Significant curriculum revisions are approved at the departmental and School of Technology levels and then reviewed by the FSC Educational Planning committee and the Office of Academic Affairs.

APPENDIX H - 1986 NCA ACCREDITATION REVIEW SELF-STUDY SURVEY

3. Measurement of Student Performance.

Student performance is measured by a combination of graded homework, exams, laboratory reports and projects. Each instructor has his own grading scale; however, there is fairly good agreement among instructors teaching the same courses.

Standardized tests are not currently in use. It would require a significant effort and allocation of faculty resources to maintain and update the variety of exams required for this approach.

Since the MET program is at the associate degree level, the MET students do not take graduate admission tests in a format that would allow comparison of performance. In fact, few technology students opt for graduate study. However, MET students usually out-perform other students in the Manufacturing Engineering Technology third and fourth year program.

In the last five years every one of the MET graduates who have taken the SME Technology Certification exam have passed it.

4. Measurement of the Quality of Instruction.

Student evaluations (Course Reaction Survey) are accomplished on all non-tenured faculty (first five years at FSC). They serve as an indicator to the department head of potential problems involving the newer faculty. Student evaluations are also used as one measure of quality by the School of Technology Promotion committee in their evaluations of candidates for promotion. There are serious questions regarding the usefulness of student evaluations for objective measurement of the quality of instruction. Grading policy may have an overly large effect on an instructor's evaluation by his/her students.

Alumni evaluations are used primarily to indicate the need for changes in specific courses rather than for measurement of instruction.

Peer and administrative evaluations are accomplished on all non-tenured faculty. These evaluations are used as an aid to help the new instructors improve their teaching capability and to eliminate problems before they are tenured.

5. Gauging the Success of MET Graduates.

MET graduates have been very successful in applications for admission for additional educational work. The class of 1985, for example, has the following record (100 % responding to a survey):

- 83 % continued studies at FSC
- 8 % continued studies at another college
- 8 % found work in their major field.

After completing their education, MET graduates have been able to pursue careers in their selected fields.

Employers have continued to evaluate MET graduates highly. Occasional exceptions occur when employers look for specialty areas that are not included in the compact two-year MET program.

APPENDIX H - 1986 NCA ACCREDITATION REVIEW SELF-STUDY SURVEY

6. Comparison of Student Application rate and Program Capacity.

Usually, the MET program quota is filled a year in advance. Presently, there are 34 applicants for 25 Fall 1986 slots. Some students wait in the wings for an opening to develop with Non-Technical status and take three years to complete the program.

7. Professional Student Organizations.

There is an active student chapter of the Society of Manufacturing Engineers that our students may elect to join. In addition, some students occasionally attend a meeting of the West Michigan chapter of the American society for Metals.

8. Meeting Faculty Development Needs.

The School of Technology encourages faculty development but provides little support or resources for this in the MET area. Funds for travel and seminar fees are almost non-existent. A large part of the problem is associated with excessive teaching loads, an absence of laboratory assistants and paper graders, and a philosophy of instruction that dates from the era of technical arts teaching at FSC. The great majority of the faculty development activities in the MET area are conducted on their own time at their own expense.

B. **Demonstration of Program Goals; Meeting standards of Related Professional Organizations.**

The concrete measures of the continued success of the MET program include the following:

- Backlog of student applicants despite the rapid decline being experienced in the number of eligible high school graduates
- Success of MET associate degree graduates in achieving their additional educational goals
- Continued employer demand for MET graduates immediately after they complete their two-year program, and also, after they complete their education.

C. **Recognition of the MET Program by Outside Agencies.**

1. Recognition by other Educational Institutions of the Quality of the MET Program.

MET graduates are regularly accepted into third and fourth year MET programs at Wayne State University and Lake Superior State College (the two institutions in the State that offer four-year MET programs).

2. Recognition by Employers of the Quality of the MET Program and Recruitment of Graduates.

Recently, a leading West Michigan manufacturing concern has established special Summer internships for MET students enrolling in the Manufacturing Engineering Technology program at FSC. There are sufficient campus recruitment visits by prospective employers to indicate a continuing and lively interest in FSC MET gradates.

3. Special Awards and Citations by External Agencies Given to the MET Program and Faculty.

In recent years no special awards or citations have been received.

APPENDIX H - 1986 NCA ACCREDITATION REVIEW SELF-STUDY SURVEY

D. Current Strengths of the MET Program.

The current strengths of the MET program include the following:

- A strong faculty: average degree - masters plus, average length of service at FSC - seven years, average length of industrial experience - 15 years,

- Laboratory facilities providing hands-on experience for students in the areas of metallurgy, materials testing, fluid mechanics, fluid power and experimental testing, and

- A program of quantitatively oriented courses in the basic subjects of mechanical engineering technology.

E. Current Concerns and Weaknesses.

With a large percentage of MET students electing additional schooling, we should provide for a B.S. degree in MET. Those graduates who have taken jobs in industry without further schooling find limited advancement potential with only an associate degree.

The other major concern, mentioned above, is the lack of adequate support for professional development of the faculty. It is of particular importance to keep abreast of technological developments and to incorporate them in the program in the face of rapid changes in our industrial society.

IV. PROSPECTS FOR FUTURE DEVELOPMENT OF THE MECHANICAL ENGINEERING TECHNOLOGY PROGRAM.

A. How Current Strengths can be Maintained.

1. Favorable Aspects of the MET Program.

Current assets of the MET program include an experienced and well-trained faculty, adequate laboratories and teaching facilities, a reservoir of interested students, and a continued demand in industry for MET graduates.

2. Program Needs to Insure Continuance of These Strengths.

The primary needs to insure maintenance of quality of the MET program include the following:

- Continuation of and financial support for faculty development to insure state-of-the-art technology training.

- Acquisition of additional new and replacement equipment in the laboratories.

- Implementation of a full four-year Baccalaureate MET program. This step will insure that the demands of two-year MET students for additional education will be met.

- Eliminating classroom lecture use of the MET laboratories.

- Disseminating information about the MET program and its content and benefits to prospective students to insure a continued pool of qualified and interested students.

3. Possible Roadblocks for Maintenance of Quality of the MET Program.

Capital equipment expenditures for the MET program must become a regular part of the School of Technology and Industrial Department budget. The only source of capital outlays in recent years has been Federal Vocational Education grants (1983-84, 1984-85, and 1985-86).

Faculty development funds are controlled at the School of Technology and Industrial Department levels. Allocation of and control of funds at the program level is necessary to implement planning and execution of satisfactory faculty training.

To date, plans for implementing a four-year MET program have received low priority and have been overshadowed by implementation of four-year programs in Plastics and Welding Engineering Technology.

The shortage of classroom space may continue to crowd the MET laboratories with inappropriate usage. A small lecture hall (50 - 75 student capacity) is needed to handle lecture groups for multiple section laboratory classes.

Rapid expansion of technology programs utilizing MET courses and faculty resources may spread the staff too thin. Planning and responding to the effects of expanding related technology programs such as Plastics and Welding Engineering Technology will be essential for the continued health of the MET program.

B. Addressing MET Program Concerns and Weaknesses.

1. Needed Corrective Measures.

The needed corrective measures for the MET program include the following:

- Provision of adequate funding for faculty development and for equipment acquisition.
- Planning for needed increase in MET staff to reflect growth in demand for related courses supporting other technology programs.
- Implementation of a four-year MET program to meet the demand of MET students for continuing education.
- Discontinuing the usage of laboratory space for classroom lectures.

2. Level and type of Resource Commitment Necessary.

No extraordinary administrative actions or commitments of large amounts of funds are necessary. Rather, what is needed is a recognition of the key role that the MET program and course offerings play in establishing the engineering technology credentials of most of the Industrial Department programs.

C. Future Needs of the MET Program.

1. Projected Changes in the MET Program Area.

The most rapid change lies in the implementation of computer hardware and software in computer-aided design, in industrial control systems and in laboratory data gathering and analysis. A shifting emphasis to computer usage in the classroom and the laboratory is already underway.

APPENDIX H - 1986 NCA ACCREDITATION REVIEW SELF-STUDY SURVEY

Impact of economic, environmental and social changes include the possible effect on student enrollment of the sharp decrease in numbers of high school graduates expected in Michigan over the next several years. To date, this decline has not impacted the MET enrollment. The shift from a national economy based on industrial production to a service-oriented economy may in the long-run decrease the demand for engineers and technologists.

2. Changes Anticipated at Other Institutions.

There is a clear trend, reflected at FSC and elsewhere, to expand engineering technology programs to a four-year format. This trend is a reflection of a number of factors. Without a baccalaureate degree, technologists often reach an early dead end in their career advancement opportunities, and as a consequence, demand additional education and training. Also, there is increasing acceptance in industry of the role of the technologist as a bridge in the gap between the craftsmen and industrialists on the one hand and the engineers and scientists on the other.

3. Possible Changes in Student Interest in the MET Program.

Because MET is a generic and fundamental area of technology with a long history of importance in industrial development, student interest can be expected to remain high. However, if the MET program remains in a two-year format, loss of students to four-year technology programs at FSC and elsewhere may be expected.

4. Anticipated Changes in Employment Opportunities for MET Graduates.

Employment opportunities in engineering and technology have been very sensitive to fluctuations in the business cycle. Indications at the present time suggest that the industrial economy in Michigan and the mid-western states will be much healthier over the next five years than it was in the 1980 - 1984 time frame.

D. Cost Projections for the MET Program.

1. Cost of Continuing the MET Program.

The cost per student-credit hour for the MET program may be expected to be subject to normal growth due to inflation and increased State of Michigan funding for technology areas.

2. Availability of Outside Funding.

Funding through outside sources has not received much attention in the MET area and has remained largely untapped. External fund-raising, particularly from key Michigan industries (automotive and automotive supply, public utilities and general manufacturing firms) could play a key role in the future development of the MET program.

E. Plans for Future Development of the MET Program.

1. Projections for future size of the MET Program.

It is expected that if the present two-year format is maintained, the number of students admitted each year might undergo a slight decrease. The MET course offerings for related programs is expected to increase substantially.

APPENDIX H - 1986 NCA ACCREDITATION REVIEW SELF-STUDY SURVEY

2. Can FSC Maintain the Future Quality of the MET Program.

The quality of the MET program can be maintained by FSC if a reasonable allocation of staff and funding is made.

3. Future Change in Focus and Direction of the MET Program.

It may be expected that if an MET program is to be maintained at FSC, then it will eventually convert to a four-year baccalaureate degree format.

Certain special areas within the scope of MET could possibly evolve into distinct and separate programs: For example, there could evolve parallel programs in computer-aided design and in experimental testing.

Mechanical Engineering Technology

Accreditation Report 1996-1997

Section 1 of 2

MANUFACTURING ENGINEERING
TECHNOLOGIES
DEPARTMENT

COLLEGE OF
TECHNOLOGY
Ferris State University
EXCELLENCE • HERITAGE • QUALITY • SERVICE • COMMITMENT

Self Study
for review of the

Associate Degree Program in
MECHANICAL ENGINEERING TECHNOLOGY

Volume I -- The Institution

prepared for the

TAC/ABET ACCREDITATION SITE VISIT

September 3, 1996

VOLUME I

QUESTIONNAIRE FOR REVIEW
of
PROGRAMS IN ENGINEERING TECHNOLOGY

Submitted by

Ferris State University

[Name of Institution]

September 3, 1996

[Date]

to the

Technology Accreditation Commission of the Accreditation Board for Engineering and Technology

111 Market Place, Suite 1050
Baltimore, Maryland 21202

ET 27A
Revised October 1995

Instructions

A. PURPOSE. The accreditation process followed by the Technology Accreditation Commission [TAC] of the Accreditation Board for Engineering and Technology [ABET] consists of the following steps:

1. A request by the institution for evaluation of its engineering technology program[s]
2. A self-study and provision of information via this questionnaire (Volume I and II)
3. An on-site visit by a team of qualified program evaluators and a team chair
4. A preliminary statement submitted to the institution for review and comment
5. A re-evaluation of the preliminary findings in light of the institution's response
6. Formal consideration by the Technology Accreditation Commission resulting in an accreditation action

This questionnaire provides essential input to the foregoing process. It should therefore be filled out completely and accurately. It should cover all programs listed in the Request for Evaluation of Engineering Technology Programs. After being submitted, any changes in the programs requested to be considered for accreditation must be confirmed in writing to TAC of ABET headquarters.

B. CONTENT. Volume I consists of requests for data and information on the institution and the engineering technology unit. Volume II requests information on each individual engineering technology program. A separate Volume II is required for each program being submitted for evaluation, except that associate and bachelor's degree offerings in the same major [2+2 programs] may be combined in a single Volume II. Also, closely related programs, as explained in section V.F.4.d. of the ABET criteria, may be bound together into a single Volume II.

C. ASSEMBLY.

1. The name of the institution and date of completion should be inserted on the master cover sheets for Volumes I and II provided with this questionnaire. The cover sheet for Volume II should also identify the program being reported.

2. In order to minimize the time and cost associated with completing the Volume I and II questionnaires, it is recommended that institutions use word processing and consider the "helpful hints" listed below:

   - the format, but not substance, of charts, tables and forms may be modified to assist in preparation by word processing

   - the questionnaire instructions and notes after the major headings must be included in the completed questionnaire. (This will aid the team chair and program evaluators when they review the questionnaire.)

   - for the various charts and tables, use footnotes to explain estimates or special situations

   - the outline of the Table of Contents must not be changed but the pagination system can be determined by the institution

   - some questions in the questionnaire may be answered by referring to appendices which contain copies of relevant pages from the institution's catalog, faculty handbook, student handbook or other publications rather than retyping these pages into the body of the questionnaire. References can also be made directly to the publication if the publication is sent to the visiting team and ABET headquarters.

- questions concerning completing the questionnaire should be directed to your team chair. If your team chair has not yet been nominated, contact Mr. James Ware, Accreditation Director for TAC of ABET at [410] 347-7720.

3. The completed questionnaire should be reproduced on 8-1/2" x 11" white paper, except that the covers should be on heavier stock and may be in any color desired by the institution. The pages should be printed on both sides of the sheet as appropriate. The questionnaire should be bound or securely fastened using any standard method available to the institution, bearing in mind that it should be convenient for use by the visiting team members. [Loose-leaf ring binders tend to be overly bulky and inconvenient to handle.] Where only one program is being visited, Volumes I and II may be combined in a single binding.

D. ADDITIONAL MATERIAL. In addition to the completed questionnaire, the following additional material must be assembled:

1. A copy of the general catalog of the institution covering course details and other institutional information applicable as of the time of the visit

2. A copy of each promotional brochure or any literature describing the engineering technology offerings of the institution to the public

3. In some cases a team chair may request supplemental information before, during or after the visit. This information might include financial data, student transcripts, verification of academic credentials, salaries, regional accreditation reports, etc.

E. NUMBER OF COPIES REQUIRED, DISTRIBUTION AND TIMING

1. Gathering of material for the questionnaire should start well in advance of the visit. In order to ensure that the institution will be prepared for the start of the TAC of ABET visit cycle, ***an advance copy of the complete questionnaire and additional information must be sent to ABET headquarters in Baltimore, Maryland by July 1.***

2. A team chair for the visit will be nominated by May and will contact the designated official of the institution to set a mutually acceptable visit date. TAC of ABET procedures require that the visit normally be scheduled between September and December. If the institution has not been contacted by the team chair by June 15, the institution should call ABET headquarters for assistance.

3. Once a visit date has been set and a team chair accepted by the institution, it is essential that questionnaires and the additional material be in the hands of the visiting team members at least 30 days before the visit. This is absolutely necessary in order to allow sufficient time for thorough study of the contents and the resolution of any questions that may arise. Late submission of the questionnaire can only hamper the efforts of the team members to perform their duties in a professional manner, and may jeopardize accreditation of the programs to be evaluated.

4. When notified by the team chair of the names and addresses of the team members, the questionnaire and additional materials should be mailed to each team member immediately.

5. Questionnaires and associated material should be sent as follows:

[a] For ABET headquarters - one copy of Volume I, one copy of the Volume II for each program, and one set of the additional material. This must be sent in time to arrive ***not later than July 1 prior*** to the visit. It should be addressed to:

Accreditation Director for Engineering Technology
Technology Accreditation Commission
Accreditation Board for Engineering and Technology, Inc.
111 Market Place, Suite 1050
Baltimore, MD 21202

[b] For the team chair - one copy of Volume I, one copy of the Volume II for each program, and one set of the additional material, ***to be held until notified by the team chair.***

[c] For each program evaluator [normally there will be a team member assigned for each program to be evaluated]- one copy of Volume I, one copy of Volume II ***for the team member's program only,*** and one set of additional material, to be held until notified by the team chair.

[d] For an engineering society observer/trainee - the same material as provided to the program evaluator representing that discipline.

[e] For a State board observer - the same material as provided to the team chair.

6. If new or updated material becomes available between the time the questionnaire is assembled and the date of the visit, it should be provided to the team members in advance or on arrival at the campus, with a copy to ABET headquarters.

7. Additional sets should be available in case of unanticipated requirements. The institution should also make copies available to those of its own personnel who will be involved in the visit. It will be expected that all program faculty and program administrators will be familiar with the questionnaire content.

F. ADDITIONAL INFORMATION.

1. Further details of the visit procedure are given in *Information for Host Institutions*, a copy of which will have been provided to the institution by ABET headquarters along with the questionnaire forms. Questions can be addressed to your team chair or ABET headquarters.

VOLUME I

THE INSTITUTION AND ENGINEERING TECHNOLOGY UNIT

Table of Contents

VOLUME I
THE INSTITUTION AND ENGINEERING TECHNOLOGY UNIT

Note: Information supplied by this questionnaire is for the confidential use of the Accreditation Board for Engineering and Technology and its authorized agents, and will not be disclosed without authorization of the institution concerned, except for summary data not identifiable to a specific institution.[1]

I. THE INSTITUTION

A. General information

Name of institution	Ferris State University	*Date*	September 3, 1996
Address	Manufacturing Engineering Technologies Department College of Technology 915 Campus Drive Big Rapids, MI 49307-2291		
Name of chief executive officer	Dr. William Sederburg, President		
Name and official position of person responsible for submitting completed questionnaire			
	Dr. Mark A. Curtis, Interim Dean, College of Technology		

B. Regional and/or other organizations by which accredited *[Give dates of initial accreditation and most recent reaccreditation.]*

Accreditation and Approval[2,3]

Ferris State University is accredited by the North Central Association of Colleges and Schools (NCA).[4] Program accreditations are listed below.

Accreditation/Most Recent Review	
Academic Program/Service Area	**Accreditation/Approval Agencies**
Education and Training of Veterans Annual review/approval for veteran benefits	State Approval Agency for the Department of Education and the Veterans Administration Michigan Department of Education
College of Allied Health Sciences	
Dental Hygiene, May 1967/May 1992 Dental Technology, May 1963/May 1992	American Dental Association Commission on Dental Accreditation

1 TAC/ABET Questionnaire instructions are shown in italics. Footnote numbering restarts in each section.
2 Ferris State University Fact Book 1995-96, pages 3-4 (Attachment 1).
3 Achieving Academic Success: A Plan for Assessing Academic Outcomes, Ferris State University, December, 1995, pages 23-24 (Attachment 2).
4 The NCA Statement of Affiliation Status is presented in Appendix A.

I.B. **THE INSTITUTION** (continued)

Accreditation/Most Recent Review	
Academic Program/Service Area	**Accreditation/Approval Agencies**
College of Allied Health Sciences (continued)	
Health Information Management, Jan 1978/Dec 1993 Health Information Technology, Sept 1975/Dec 1993	Commission on Accreditation of Allied Health Education Programs
Industrial and Environmental Health, 1972/Oct. 1990	National Environmental Health Sciences Protection Accreditation Council of the National Environmental Health Association
Medical Laboratory Technology, Oct 1978/Oct 1994 Medical Technology, Oct 1978/Oct 1994	National Accreditation Agency for Clinical Laboratory Sciences
Nuclear Medicine Technology A.A.S. June 1976/Feb 1992 B.S. Jan 1978/Feb 1992	Joint Review Committee on Educational Programs in Nuclear Medicine Technology
Nursing - A.A.S. Degree, 1969/1992	Michigan State Board of Nursing
Nursing - B.S.N. Degree, Oct 1988	National League for Nursing
Radiography, 1972/Aug 1992	Joint Review Committee on Education in Radiologic Technology
Respiratory Care, April 1975/Dec 1991	Commission on Accreditation of Allied Health Education Programs
College of Arts and Sciences	
Social Work, 1989/1995	Council on Social Work Education
College of Business	
Accountancy (approved by State Licensing Bureau)	State Board of Accountancy
Legal Assistant, 1978/1988	American Bar Association
College of Education	
Criminal Justice - Corrections Officer	Michigan Corrections Officer Training Council
Criminal Justice - Specialist	Michigan Law Enforcement Officer Training Council
Teacher Education (approved by State, not accredited)	Michigan Department of Education/Michigan State Board of Education
Tot's Place (child care center)	State of Michigan Family Independence Agency
College of Optometry	
Opticianry, 1992	Commission on Opticianry Accreditation
Optometry and Optometric Technician, 1991	Council on Optometric Education
College of Pharmacy	
Pharmacy B.S., 1939/1991-92 Pharm.D. (started 1990), 1993-94	American Council on Pharmaceutical Education
College of Technology	
Construction Management, 1993	American Council for Construction Education
Electrical/Electronic Engineering Technology, 1994-95	Accreditation Board for Engineering and Technology Technology Accreditation Commission (TAC)
Surveying Engineering, 1987/1993-94	Accreditation Board for Engineering and Technology Engineering Accreditation Commission (EAC)

I.B. THE INSTITUTION (continued)

In west-central Michigan the University also serves a community college function. Its two-year associate degree programs may qualify for capital equipment grants. These Federal vocational education matching fund grants are administered by the State Board of Education. The qualifying programs are reviewed on a five year cycle.

1995-2000 Community College Evaluation Schedule
For State Board of Education Approved Occupational Programs[5]

College/Program Name	Proposed Evaluation Year					Year of Last Evaluation
	95-96	96-97	97-98	98-99	99-00	
College of Allied Health Sciences						
Dental Hygiene				X		93-94
Dental Technology				X		93-94
Health Information Technology				X		93-94
Medical Laboratory Technology			X			92-93
Nuclear Medicine Technology			X			92-93
Nursing				X		93-94
Radiography (X-Ray)			X			92-93
Respiratory Care			X			92-93
College of Arts and Sciences						
Industrial Chemistry Technology					X	94-95
Pre-Mortuary Science	X					
College of Business						
Administrative Assistant			X			92-93
Court & Freelance Reporting			X			92-93
Food Service Management				X		93-94
General Business					X	94-95
Journalism				X		93-94
Legal Assistant				X		93-94
Office Admin. - Executive Secretary				X		92-93
Office Admin. - Legal Secretary				X		92-93
Ornamental Horticulture Technology					X	94-95
Real Estate			X			93-94
Retailing				X		93-94
Visual Communication					X	94-95
College of Education						
Child Development					X	94-95
College of Optometry						
Opticianry					X	94-95
Optometric Technician					X	94-95

5 Achieving Academic Success: A Plan for Assessing Academic Outcomes, Ferris State University, December, 1995, pages 25-26 (Attachment 2).

I.B. **THE INSTITUTION** (continued)

Program Name	**Proposed Evaluation Year**					**Year of Last Evaluation**
	95-96	**96-97**	**97-98**	**98-99**	**99-00**	
College of Technology						
Architectural Technology	X					90-91
Automotive Body		X				91-92
Automotive Service Technology		X				91-92
Building Construction Technology	X					90-91
Civil Engineering Technology	X					90-91
Heavy Duty Engine Technology					X	
Heavy Equipment Technology				X		
HVACR Technology	X					90-91
Industrial Electronics Technology	X					90-91
Manufacturing Tooling Technology		X				91-92
Mechanical Engineering Technology			X			92-93
Plastics Technology		X				91-92
Printing Technology		X				91-92
Surveying Technology	X					90-91
Technical Drafting & Tool Design		X				
Welding Technology		X				91-92

C. **Type of evaluation requested** *[Check applicable type.]*

Initial accreditation **X** *Reaccreditation* ___

Dates of past TAC of ABET accreditations: *Initial* **N/A** *Most recent* **N/A**

I. THE INSTITUTION (continued)

D. Administrative/Organizational Changes

Describe significant changes within the past five years for the entire institution.

None.

II. GENERAL INFORMATION REGARDING THE ENGINEERING TECHNOLOGY UNIT

A. Officials

1. *Name and title of the individual in charge of engineering technology:*

   Dr. Mark A. Curtis, Interim Dean of Technology

2. *Name and title of responsible officials at branch campuses and/or off-campus facilities [if any]:*

   Dr. Mark A. Curtis, Interim Dean of Technology

B. Type of organization *[Check applicable type and explain if necessary.]*

___ *Independently organized college or technical institute [not a division within a university]*

___ *School or division within a college or university under an administrative head who reports directly to the chief executive officer.*

X *Engineering technology division or unit reporting to an administrative officer other than the chief executive officer*

___ *Separate evening division not under the same administration as full-time day division*

___ *Central engineering technology administrative unit for multi-campus institutions*

___ *Other [specify]*

II. GENERAL INFORMATION REGARDING THE ENGINEERING TECHNOLOGY UNIT (continued)

C. Branch campuses and off-campus facilities

Describe all branch campuses and/or off-campus facilities used in connection with the program[s] being evaluated.

N/A[1]

D. Administrative/Organizational Changes

Describe significant changes within the past five years to the engineering technology unit.

Over the past five years the organizational structure of the College of Technology has remained unchanged. At the present time a reorganization plan for the College is under review.

E. Procedures employed to maintain competence of the faculty and currency of the programs

Describe any activities, organizational units, and related facilities which are associated with the engineering technology unit and operated for purposes of developing the professional currency of the faculty and maintaining the technical currency of the programs. Include such activities as research programs, technical curriculum studies, seminars, faculty development programs and opportunities, leaves of absence for industrial experience, summer employment opportunities, industrial advisory committee activities, provisions for encouragement of faculty participation in committee activities of technical societies, etc. If individual programs have different procedures to maintain competency, explain those differences in this section.

Faculty Development

Formal faculty development efforts are centered in programs that support Sabbatical Leaves, Faculty Research Grants, Faculty Development Grants, professional travel, and in-service workshops.

A portion of the funding for professional travel and Faculty Development Seminars comes from the Office of Academic Affairs. The remainder comes from funds that are a part of the budgets of the various colleges and departments. Faculty within the College of Technology also have the opportunity to become involved in appropriate projects and studies in conjunction with the Technology Transfer Center (TTC). The TTC is a technical assistance and product development arm of the College of Technology. Assistance with the development of teaching skills is provided through the College of Education with courses and various other sessions for faculty to update classroom techniques. The College of Technology also has new faculty participate in a development program, and encourages their participation in other phases of faculty development activities.

Areas of faculty development activities include:

(1) Sabbatical Leave
Sabbatical leave policy is governed by provisions of the Ferris State University (FSU)/Ferris Faculty Association (FFA) contract.[2] Sabbatical leave proposals are evaluated by a tier of committees:
- Departmental Committee on Sabbatical Leave
- College of Technology Committee on Sabbatical Leave
- University Committee on Sabbatical Leave

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1 The program being evaluated, A.A.S. in Mechanical Engineering Technology, is not offered at any off-campus location.

2 Appendix B: FSU/FFA Contract Provisions - Sabbatical Leave.

II. E. GENERAL INFORMATION REGARDING THE ENGINEERING TECHNOLOGY UNIT (continued)

(2) Faculty Development Grants
Proposals for professional development grants are evaluated by the University Professional Development Committee.[3]

(3) Timme Center for Teaching Excellence
The primary purpose of the Center is to encourage and support improvement of teaching and learning at the University.[4] Two types of grants are available:
- Mini-Travel Grants
- Instructional Assistance Grants

(4) Research Grants
Faculty research grants may be obtained by application to the University Faculty Research Committee.[5]

(5) In-Service Activities
Faculty in-service workshops are offered from time to time.

(6) Program Reviews
Program Reviews are conducted on a systematic basis by the University Academic Program Review Committee

(7) Industry Advisory Committees
Programs in the College of Technology meet on a regular basis with their respective Industry Advisory Committees. These committees provide a valuable reference point for program evaluation and for establishing new directions.

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3 Appendix C: Faculty Development Grants.
4 Appendix D: Timme Center for Teaching Excellence.
5 Appendix E: Faculty Research Grant Program.

II. GENERAL INFORMATION REGARDING THE ENGINEERING TECHNOLOGY UNIT (continued)

F. Policy regarding consulting work

Describe policy toward private consulting work, sponsored research projects, and extra compensation. Formal written policies addressing this section may be included in the Appendix or referenced to publications, such as catalogs, handbooks or administrative documents.

Outside consulting services may be engaged in for up to ten days per year for individuals with an academic year appointment and 13 days per year for individuals with a 12-month appointment.[1]

G. Policy regarding attendance at technical society meetings

Describe policy toward permission to attend meetings of local or State and national technical societies and allowance of travel expenses for such meetings. Formal written policies addressing this section may be included in the Appendix or referenced.

Professional staff are encouraged to attend conferences, workshops, training seminars, and professional meetings. Individuals may apply for funding from a number of sources within the University, including departmental and college allocations, Timme Mini-Travel Grants and Faculty Development Grants. To the extent that funds are available many participate.

From time to time the University hosts and sponsors technical society meetings. This year the College of Technology sponsored the Midwest Regional Conference of the American Society for Engineering Education.

H. Programs offered and degrees granted *[directions for table on next page]*

Programs for each department should be listed together. The first column should list all programs in engineering technology offered by the department, including any for which accreditation is not being sought. If it is desired that options be accredited and listed as separate programs in the ABET Annual Report, they must be separately identified in the institution's official catalog and should be listed separately in the table. It should be noted that options to be accredited separately will require a separate evaluator. If the curricula in evening or co-op programs, or in programs offered at different off-campus locations, differ from the regular day program, they should be listed separately in anticipation of separate evaluation.

Evening programs will be accredited separately from regular day programs in the same curricular area unless the day and evening programs follow the same curriculum, are under the supervision and control of the full-time program faculty, use the same or equivalent laboratory equipment, and include equal rigor in student work and grading. The same conditions apply if a program is offered at two or more different locations. Where a program includes day and evening components that are academically the same, as noted above, and are not intended to be accredited as separate program, this should be indicated by checking both "day" and "evening" on the same line in column 2. [Refer to section II.A.3 of the ABET Criteria for Accrediting Programs in Engineering Technology for further information on the proper identification of options, evening programs, and multi-campus programs.]

The other columns are self-explanatory and should be filled out completely for each program. The institution may choose to construct this table in a format to facilitate word processing.

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1 Appendix F: Policy and Procedures Governing Outside Consulting Activities.

II.H. PROGRAMS OFFERED AND DEGREES GRANTED BY THE COLLEGE OF TECHNOLOGY

1 Name of Program (by Department)	2 Type of Program (Check all that apply.)					3 Degree or Credential Conferred	4 Name and Title of Person in Charge	5 Submitted for Evaluation		6 Offered, Not Submitted for Evaluation	
	Day	Eve	Co-op	Full Time	Part Time			Now Accred-ited	Not Now Accred-ited	Now Accred-ited	Now Not Accredited
AUTOMOTIVE DEPARTMENT							Lester J. Richards, Acting Department Head				
Automotive and Heavy Equipment Management	X	X		X	X	Bachelor of Science					X
Automotive Body	X			X		Associate in Applied Science					X
Automotive Service Technology	X			X		Associate in Applied Science					X
Heavy Equipment Service Engineering Technology	X			X		Bachelor of Science					X
Heavy Equipment Technology	X			X		Associate in Applied Science					X
CONSTRUCTION DEPARTMENT							Robert Eastley, Acting Department Head				
Architectural Technology	X			X		Associate In Applied Science					X
Building Construction Technology	X			X		Associate In Applied Science					X
Civil Engineering Technology	X			X		Associate In Applied Science					X
Construction Administration	X			X		Certificate					X
Construction Management[1]	X	X		X	X	Bachelor of Science				X	
Facilities Management	X	X		X	X	Bachelor of Science					X
Facilities Management (to start Fall 1996)	X			X		Minor					X
Field Engineering (started Fall 1995)	X			X		Certificate					X
HVACR Engineering Technology	X	X		X	X	Bachelor of Science					X
HVACR Technology	X			X		Associate In Applied Science					X
Project Management (started Fall 1995)	X			X		Certificate					X
Surveying Engineering	X			X		Bachelor of Science				X	
Surveying Technology	X			X		Associate In Applied Science					X

1 The Construction Management program is accredited by the American Council for Construction Education.

II.H. PROGRAMS OFFERED AND DEGREES GRANTED BY THE COLLEGE OF TECHNOLOGY (continued)

1 Name of Program (by Department)	2 Type of Program (Check all that apply.)					3 Degree or Credential Conferred	4 Name and Title of Person in Charge	5 Submitted for Evaluation		6 Offered, Not Submitted for Evaluation	
	Day	Eve	Co-op	Full Time	Part Time			Now Accred-ited	Not Now Accred-ited	Now Accred-ited	Now Not Accredited
ELECTRICAL/ELECTRONICS DEPARTMENT							Philip P. Marcotte, Department Head				
Computer Networks and Systems (to start Fall 1996)	X			X		Bachelor of Science					X
Electrical/Electronics Engineering Technology	X	X		X	X	Bachelor of Science				X	
Industrial Electronics Technology	X			X		Associate in Applied Science					X
GRAPHIC ARTS DEPARTMENT							Robert Stechschulte, Department Head				
Printing Management	X			X		Bachelor of Science					X
Printing Technology	X			X		Associate in Applied Science					X
MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT							Douglas G. Chase Jr., Acting Dept. Head				
Manufacturing Engineering Technology	X	X		X	X	Bachelor of Science					X
Manufacturing Tooling Technology	X			X		Associate in Applied Science					X
Mechanical Engineering Technology	X			X		Associate in Applied Science			X		
Plastics Engineering Technology	X	X		X	X	Bachelor of Science					X
Plastics Technology	X			X		Associate in Applied Science					X
Product Design Engineering Technology	X	X		X	X	Bachelor of Science					X
Quality Engineering Technology (to start Fall 1996)	X	X		X		Bachelor of Science					X
Quality Technology	X	X		X		Certificate					X
Technical Drafting and Tool Design	X			X		Associate in Applied Science					X
Welding Engineering Technology	X			X		Bachelor of Science					X
Welding Technology	X			X		Associate in Applied Science					X

III. PHYSICAL FACILITIES AND LIBRARY

A. Additions to the Engineering Technology Unit

Describe significant additions within the past five years to the physical facilities of the entire institution that are used in connection with the instruction of engineering technology students or are of importance to the work of the engineering technology unit.

In the College of Arts and Sciences the Starr building, the Williams auditorium and the Science building are undergoing major renovation and new construction. The funds allocated total $30 million. Completion is expected in the 1996-97 school year. The new classrooms will have state-of-the-art communications systems and the laboratories will be re-equipped and enlarged. College of Technology students taking courses in the areas of physical sciences, mathematics, and general education will be beneficiaries.

It is expected that the State Legislature will complete passage of a capital outlay authorization for an elastomer applied research facility at Ferris. It will be the first facility in the nation dedicated to education in the rapidly expanding field of plastics and elastomers and will include classrooms and laboratory instruction facilities

Also under consideration in the Legislature is funding authorization for a new library building at Ferris. This would permit a major increase in the archive collections as well as an expansion and improvement in library services.

B. Library

1. *Indicate whether the facilities are administered within the engineering technology unit ___ or by a central library* **X**.

2. *Indicate the approximate number of acquisitions since the last inspection TAC of ABET visitation [or in the past five years if this is an initial inspection] and the present total number of books and bound periodicals. Provide statistical data concerning the currency of the collection.*

TIMME LIBRARY HOLDINGS -- FALL 1994[1]

Description	Total
Monograph Titles	186 049
Serial Titles	5 440
Items Bar-coded for Circulation	362 947
Microforms (pieces)	3 259 988
U.S. Documents	64 058
Cartographic Materials	6 873
Miscellaneous Media Pieces	66 473
Michigan and U.S. Government Publications	70 000
Audio-Visual Items	80 000

[1] Ferris State University Fact Book 1995-96, page 9 (Attachment 1).

III.B.2. PHYSICAL FACILITIES AND LIBRARY (continued)

Years covered: **1994 - 1996**[2]

Category	Added		Total	
	Books	Periodicals[3]	Books[4]	Periodicals
Entire Institution's Library Collection	4 600		242 988	97 000 Volumes 3 976 Titles
In the fields of Engineering and Technology (included above)[5]				
Technology (General) (*T*)[6]	150		22 595	35 Titles
Engineering (General). Civil engineering (General) (*TA*)	177			42
Hydraulic engineering (*TC*)	0			4
Environmental technology (*TD*)	50			6
Highway engineering (*TE*)	13			5
Railroad engineering and operation (*TF*)	0			0
Bridge engineering (*TG*)	0			0
Building construction (*TH*)	159			15
Mechanical Engineering (*TJ*)	69		890	30
Electrical Engineering (*TK*)	522		2 859	58
Motor vehicles. Aeronautics. Astronautics. (*TL*)	38			36
Mining engineering. Metallurgy (*TN*)	4			3
Chemical technology (*TP*)	66			23
Manufactures (*TS*)	134			29
Chemistry (*QD*)	74		3 406	
Mathematics (*QA*)	448		3 581	63
Physics (*QC*)	58		2 295	8

3. *For the appropriation of library funds, indicate the funds allotted for books, periodicals, and other materials for the past five years.*

Timme Library Appropriations 1994 - 1996[2]

Total engineering technology appropriation			**$ 117 326**
Engineering and technical books	$ 72 466		
Engineering and technical periodicals	$ 40 660		
Other materials and services [explain]	$ 4 200	indexing	

2 Library acquisition data for years prior to 1994 were not available.
3 Periodical acquisition data was not available.
4 Book holding data by category were incomplete.
5 *By discipline or subject area if possible.*
6 Letters in italics are Library of Congress classification codes.

III.B. PHYSICAL FACILITIES AND LIBRARY (continued)

4. *Are there separate engineering technology collections located in the various technology departments or are all volumes housed in the central library? Briefly explain arrangement, and describe the library physical facilities. [Explain how students access computerized databases and information sources.]*

All the engineering and engineering technology-related volumes are housed in the central library.

As the information resource center on campus, the University library system offers a full complement of instructional opportunities, materials, and services.

The University libraries include the Abigail S. Timme Library and the Health Sciences Library. Opened in 1967 and recently renovated, the Timme Library is a three-level building situated near the center of the campus. It houses an increasing collection of materials approaching three quarters of a million books, periodicals, State of Michigan and U.S. government documents, research reports, audiovisual items and other materials. The libraries' holdings are integrated by format and linked electronically through the on-line public access catalog (OPAC). The local area network (LAN) hosts an expanding collection of locally loaded commercial databases. Searching these resources is an available option in various microcomputer labs and offices located around campus.

Collections are integrated on the shelves by format and are accessed through the OPAC. Access to the Library's Local Area Network (LAN), which includes the OPAC and an expanding collection of CD-ROM products, is available in faculty offices as well as student computer laboratories across the campus. In 1991 the Timme Library was designated a Federal Patent and Trademark Depository Library.

Computerized indexes to periodicals, as well as Library's on-line catalog (OPAC), may be found in the Automated Reference Center on the first floor.

To meet diverse learners' needs, classroom faculty and library faculty collaborate on offering multiple instructional approaches. Group orientation sessions and individual assistance are designed to make the library easy to use.

A collection of mechanical engineering technology monographs and periodicals is housed in the central library. Periodicals, in both print and microfilm format, are located on the second floor, while monographs in the mechanical engineering (*TJ*) Library of Congress classification are housed on the third floor.

5. *During what hours are library facilities available to engineering technology students? When is reference service available? Are the stacks open? Are services available to evening students?*

The Timme Library is open more than 80 hours per week when the University is in session. Specific hours for Fall and Winter Semesters are:

Monday - Thursday	8 a.m. to 10 p.m.
Friday	8 a.m. to 5 p.m.
Saturday	12 noon to 5 p.m.
Sunday	1 p.m. to 10 p.m.

III.B.5. PHYSICAL FACILITIES AND LIBRARY (continued)

A separate study area adjoining the first floor of the Library is open until 11 p.m. Monday through Thursday and later hours are available in this room during final examination week. Reference services are available during open hours with the exception of 8 a.m. to 9 a.m. daily, 12 noon to 1 p.m. on Saturday, and 9 p.m. to 10 p.m. on those nights when the building is open until 10 p.m.

All book stacks and periodical stacks are open to patrons. The services described above are available to evening students and every effort is made to offer comparable services and materials to off-campus students.

6. *Briefly explain the professional services available and the trained library staff assigned primarily to assist the engineering technology unit.*

The Ferris State University Library Liaison program, initiated in 1976, provides each academic department on campus a liaison librarian who serves as the "first point of contact" for library instructional support, services, and materials. Librarians are selected for assignment on the basis of their knowledge of the field involved. Responsibilities include:

Teaching classes how to find and evaluate information sources

Assessing the library collection to ascertain its suitability in supporting the various departmental missions

Updating the collection with assistance from faculty

Sharing library programming information with the faculty

Participating in the preparation of accreditation reports

Assisting faculty with individual research needs.

7. *Briefly discuss the size, qualifications, and experience of the library staff.*

The Library administration consists of the Dean of Library and Instructional Services (LIS), and three department heads: Reference and Instructional Services (RIS), Collection Management Services (CMS), and Library Systems and Operations (LSO). All persons presently in these positions hold the M.L.S. degree. Thirteen librarians, each holding an M.L.S. from an American Library Association accredited library school, also hold academic rank with six at the level of Professor. Nine have more than twenty years of experience each at Ferris. Several hold additional degrees beyond the M.L.S. As University faculty, several librarians have held increasingly responsible positions on University-wide committees as well as in the Academic Senate. The Library staff also includes sixteen clerical/technical staff as well as six library assistants.

8. *Briefly discuss the availability of technical manuals, trade magazines, specifications, etc. to engineering technology students.*

Technical manuals and periodicals are available as part of the central library collection. Access through indexes and computerized databases is described in section III.B.4. Students also have access to patent and trademark information.

IV. FACULTY

A. Policy on promotion and tenure

1. *For each rank given the customary term in years for staff appointment [i.e., one year, five years, indefinite, etc.] and indicate the conditions under which the appointment involves promotion and tenure. Formal written policies addressing promotion and tenure may be included in the Appendix and referenced.*

Minimum Duration for Tenure Track and Promotion/Merit Increases

Academic Rank	Minimum Duration (Years)			
	Tenure Track	Promotion	Merit Increase	Term of Tenure
Professor	3	-	4	Indefinite
Associate Professor	4	5	4	Indefinite
Assistant Professor	5	4	4	Indefinite
Instructor	5	3	4	Indefinite

See Appendices for policies conditions on tenure and promotion.[1]

2. *Are engineering technology faculty members promoted and tenured at a rate similar to other faculty members at the institution? Discuss briefly.*

Yes, the number of promotions per year for faculty within the College of Technology has been allocated in the same proportions as for faculty in other colleges of the University. The establishment of tenure policy and the granting of tenure is addressed within each department of the College and by the contract between the University and the Ferris Faculty Association.

V. ADMISSION AND RETENTION POLICIES AND SERVICES

Note: The institution should be prepared to provide admission records and transcripts for examination by the visiting team, as requested by the team chair prior to, during and after the visit..

A. Principal basis for admission*

Indicate, in order of importance, the basis of admission into the engineering technology unit and specific engineering technology programs, if different [e.g., College Entrance Board Examination; State Board Examination; certification from secondary schools, specifying class standing and basis of approval of schools; aptitude test, etc.]. Give approximate percentages of students admitted under each plan. If admission requirements for part-time, evening, or co-op students are different, please explain.

**Formal written policies, such as are presented in catalogs or brochures, may be included in the Appendix and referenced.*

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[1] Appendix G: FSU/FFA Contract Provisions - Tenure.
Appendix H: Tenure Policy - Manufacturing Engineering Technologies Department.
Appendix I: FSU/FFA Contract Provisions - Promotion.

V.A. ADMISSION AND RETENTION POLICIES AND SERVICES (continued)

Ferris State University Admission Requirements[2]

The University has an open admissions policy that, within the limits of its resources, allows applicants, including some with marginal academic records, the possibility of achieving a university education. That policy is backed by the University's commitment to provide a student with the opportunity for a successful experience by offering provisional admission and making developmental classes available.

Admission to the University does not guarantee admission to individual programs, many of which have additional entry requirements. Acceptance in a particular program is based upon an individual's qualifications. In most instances where enrollment demand for an undergraduate program exceeds capacity, the date on which the University receives the paid application of a qualified applicant serves as the determining factor for admission to that program.

Under some circumstances, admission decisions may also involve other considerations. An applicant, particularly a non-traditional student, may have acquired competencies beyond those reflected in the high school grade point average, ACT score, or previous college-level work. For that reason, consistent with the University's role and mission, an applicant may be admitted on the basis of an assessment of the skills and knowledge acquired outside the traditional educational setting.

College of Technology Admission Requirements[3]

Admission is open to high school graduates, as well as non-graduates, who demonstrate by other means that their backgrounds are appropriate to their chosen programs. All students are expected to demonstrate maturity and seriousness of purpose to meet their goals.

Due to the specialized study in the various programs, students may need additional course work that they may pursue prior to admission to the College of Technology. The additional courses may be taken along with work in the College. In either case, it may take longer to complete the program.

Students who do not meet immediate entrance requirements may be accepted by the College of Technology on a pre-technical basis pending completion of all the prerequisites before admission into the program. If prerequisites must be taken, additional time is required for degree completion.

Opportunities are available for associate degree graduates of the College of Technology to transfer into a variety of bachelor's degree programs at Ferris. These opportunities include degree programs within the Colleges of Technology, Business, Education, and Arts and Sciences.

Admission into the Mechanical Engineering Technology Program

Admission requirements for the associate degree program in Mechanical Engineering Technology include those listed above for admission to the University and to the College of Technology. Requirements specific to this program are:

(1) High School graduate or the equivalent (GED).

(2) 2.0 or above grade point average (high school or previous college).

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2 1995-97 University Catalog, pages 42-48 (Attachment 3).

3 Ibid., page 213.

V.A. ADMISSION AND RETENTION POLICIES AND SERVICES (continued)

(3) Placement in MATH 116 Intermediate Algebra and Trigonometry or higher; 19 or above ACT math sub-test score, or successful completion of an appropriate prerequisite collegiate math class.

If the program enrollment fills to capacity, then other qualified applicants may be put on a waiting list, with priority based upon the date of their application.

V. ADMISSION AND RETENTION POLICIES AND SERVICES (continued)

B. Changes in requirements during recent past years

Describe any changes in requirements for admission to the engineering technology unit or specific program, if different, since the date of last visit or during past five years if this is an initial visit.

None.

C. Policy on admission with conditions

Explain the policy on admitting students with conditions, and state how conditions must be addressed by the student.

Students who do not qualify for direct admission to a program may be admitted to the University in the following ways:

(1) *Probationary admission.* Applicants with less than a 2.0 grade point average (GPA) may be admitted to the Collegiate Skills or Directed Studies program under the general University Admissions Policy. Applicants admitted under these conditions must successfully complete 12 or more semester hours of credit with at least a 2.0 GPA.

(2) *Pre-technical status.* Applicants who possess a cumulative GPA greater than 2.0 but who lack the mathematics background for placement in Math 116 or above are admitted to Pre-Mechanical Engineering Technology. Upon successful completion of Math 110, students are eligible to enter the technical course sequence of the program.

D. Policy regarding admission with advanced standing and transfer credit

Describe the general policy and methods of the engineering technology unit in regard to admission with advanced standing, including any requirements or agreements for transfer entry. Describe procedures for evaluating, accepting, and documenting transfer credits. State who authorizes transfer credit.

Students are admitted to the associate degree program in Mechanical Engineering Technology (MET) with advanced standing if they have completed equivalent course work at another institution.[1]

There are no transfer entry agreements with other institutions for the MET program.

Within the College, transfer credits are evaluated, accepted, and documented by the Office of the Dean of Technology. A grade of C (2.0) or better is required for acceptance of transfer credit. The Dean of Technology authorizes the acceptance of transfer credits.

E. Times of admission

How often and when are students admitted each year?

Students are admitted to the University in the Fall, Winter, and Summer semesters each academic year.

F. Admission guidance services

Describe guidance services rendered to students on admission.

Admissions Counselors, Educational counselors, program faculty and staff are available to provide guidance services to prospective and enrolled students.[2]

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1 1995-97 University Catalog, pages 43-44 (Attachment 3).
2 Ibid., pages 53-54.

V. ADMISSION AND RETENTION POLICIES AND SERVICES (continued)

G. Placement tests

Indicate what placement tests are generally administered and what norms are available. What specific use is made of the test results?

The ACT Student Profile Report, Advanced Placement Program, College Level Examination Program (CLEP), Armed Forces Study, and Course Competency Assessment are the placement tests generally administered at Ferris.[3]

The norms available for ACT are Ferris, State and National percentiles. A student who scores in the 50th percentile or better in the CLEP test is awarded credit. In Advanced Placement the norms are national and a student scoring 3 or higher is awarded credit. Course competency assessment is administered by faculty in the respective departments. The norms are established by the department and are based on reasonable expectations as established by the department and by faculty teaching the course.

The test results are used to determine placement in the program(s) and/or placement in specific courses, and award of credit for which the exam is taken.

H: Remedial programs and services

Briefly describe remedial programs and academic counseling services available to students with deficiencies.

There are a variety of services available to students across the campus. The following are offered by Student Development Services:

Free Tutoring - Tutorial assistance by successful students is available for most courses offered at Ferris. Workshop tutors are assigned to a room for regular weekly hours. One-to-one tutoring is available to students with more extensive learning disabilities.

Collegiate Skills Program - Designed to help academically under-prepared students succeed in college, this program offers students assistance in reading, writing, and study skills.

Directed Studies - This program is designed for students who intend to enroll in either Liberal Arts, Pre-Law or Social Work, with an ACT composite score below 16 or ACT scores that are not available to Ferris. Program advisors assist students in developing a program of study to strengthen academic readiness for Ferris curricula.

Special Needs Services - These services include counseling/advising, classroom accommodations. academic assistance such as tutoring, textbook reading/taping, alternative testing and campus advocacy.

Academic Skills Center - Special instruction in reading, study skills, and survival skills is offered. The goal of the center is to assist students in improving their academic performance.

Intensive English Program (IEP) - The IEP is designed for students for whom English is a second language. This program helps improve their language skills, enabling them to fully benefit from their educational and cultural experiences in the United States.

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3 1995-97 University Catalog, pages 45-46 (Attachment 3).

V.H. **ADMISSION AND RETENTION POLICIES AND SERVICES** (continued)

Office of International Education and Services (IES) - The function of IES is to organize special educational programs and to provide services to international students and faculty, facilitating and promoting international education and global understanding.

Minority Retention Program - This program is designed to enhance the retention of all Ferris minority students. The program provides advising and counseling assistance as well as other academic support services.

Vocational Educational Support Services Program (VESSP) - This Carl Perkins Act funded program provides extra support services for special needs students in two-year vocational education programs.

Classes available through Student Development Services:

UNIV 101 - College Study Methods
UNIV 102 - Career and Educational Planning
UNIV 103 - University Transition Seminar
UNIV 105 - Math Study Methods
UNIV 106 - College Reading Methods
UNIV 176 - College Critical Reading

Academic Counseling for College of Technology students is available through:

Student Development Services - Starr 123 (temporarily relocated while the Starr building is being rebuilt and renovated).

College of Technology - Johnson Hall 200

I. **Student records**

Briefly describe the size and qualifications of student records staff, the methods used for maintenance and security of student records, and the method used to verify that candidates for graduation have met degree requirements. State who certifies a candidate for graduation.

The staff of the Registrar's Office at Ferris State University is composed of four professionals and six clerical staff members. In addition to the registrar, responsible primarily for the maintenance of the student academic records, a coordinator of registration, responsible for all aspects of student registration; and a coordinator of academic scheduling information, responsible for administering the university master course file, coordinating the course offering portion of the class schedule, and maintaining the academic classroom inventory. Each of the six clerical employees have various duties that correspond to the registration, student record, and certification functions of the office.

The Registrar is the official custodian of the student academic records at Ferris State University. All hard (paper) copy records are secured in fire proof files in the Registrar's Office. Duplicate copies of all paper records are stored both in the Registrar's Office and in another location on campus. Backup copies of on-line computer records are maintained on disk and/or tape in the Computer Center and in other locations, both on and off campus.

V.I. ADMISSION AND RETENTION POLICIES AND SERVICES (continued)

The policies and provisions of the Family Educational Rights and Privacy Act (FERPA) govern the review and release of information from student educational records. All data contained in a student's educational records, both hard copies and on-line computer records, are kept confidential. Each member of the Registrar's staff is required to receive specific on-going training on the security of student academic records. A matrix has been developed by the Registrar to assist office and campus personnel on what student data can and cannot be released to the public.

The Student Information Systems (SIS+) has the capability of providing various levels of security, from single element to entire system access. All campus users, including those in the Registrar's Office, may be granted access to the system only through the approval of the Registrar. (Initial justification of the need to access data must be granted by the employee's appropriate dean/director.) Access to the student records system is granted only to those who have been determined by the nature of their job to have a legitimate educational "need to know."

Each person who has access to any elements in the student records system is issued a security password, which must be change periodically. For both security and auditing purposes all system transactions are logged by password.

Each Ferris employee is required to sign a "responsibility" statement whenever access to the system is given. This statement informs the individual that inappropriate use or misuse of information contained in the records of Ferris State University students is in direct violation of University policy and the provisions of FERPA. Furthermore, it notes that such action could result in civil and/or criminal prosecution.

When candidates for graduation complete their "request for graduation" forms, they then meet with their advisors to clear for graduation. Their academic files are pulled and transcript evaluations are completed. This evaluation is done to insure that students have completed all University, College, and program requirements for their degrees. If the student is deficient he/she is notified that such a deficiency exists and must be made up.

During the course of their stay at Ferris, students are assigned a faculty adviser from within their respective programs. The faculty member helps insure that the student meets the requirements of the degree.

J. Studies and student performance

Briefly describe any methods used to study the performance of enrolled students.

The institution collects data on "special populations students" as required by the Perkins Standards and Measures for Michigan Community Colleges. This study is used to show the success rate for special populations students and typical population students in:

Standard Basic Academic Skills Attainment
Advanced Academic Skills Attainment
Occupational Work Skills Attainment

The Office of Student Development Services also conducted a "First Year Experience" study on a select group of students. This study included many areas as well as academic performance. The study included such items as the students own perception of their chances of success in college, their confidence in their instructors, and their confidence in the University administration.

V.J. ADMISSION AND RETENTION POLICIES AND SERVICES (continued)

The University has initiated a comprehensive "Outcomes Assessment" effort.[4]

K. Other student services

Briefly describe any other student services particularly relevant to the engineering technology program[s].

Within the College of Technology there is a full-time counselor to help students with a variety of academic as well as non-academic problems or situations.

Also, each student in the College is assigned to a faculty advisor in their program area. The faculty member has the responsibility of guiding the student academically and making sure the student stays on track. If warranted, the advisor may recommend remediation.

4 Achieving Academic Success: A Plan for Assessing Academic Outcomes, Ferris State University, December, 1995 (Attachment 2).

VI. REQUIREMENTS FOR GRADUATION

Note: The institution should be prepared to provide transcripts for examination by the visiting team, as requested by the team chair.

A. Average grade required

What cumulative grade point average (GPA) is required for graduation?

A minimum GPA of 2.0 is required for all students graduating from the University.[1]

B. Description of grading system

Describe the grading system including numerical/letter grade equivalents, method of determining grade point average (GPA), handling of repeat courses, probation, expulsion, etc.

Grading System Used in Determining Grade Point Averages (GPA)[2]

Letter Grade	Significance	GPA per Credit Hour
A	Superior	4.0
A-		3.7
B+		3.3
B	Above Average	3.0
B-		2.7
C+		2.3
C	Average	2.0
C-		1.7
D+		1.3
D	Below Average	1.0
D-		0.7
F	Failing	0.0

The use of the plus or minus in grading is optional. The assignment of grades is a faculty responsibility. The GPA is calculated as the ratio of the sum of the product of honor points and credit-hours for each course to the sum of the total credit-hours.[2]

Other grades may be assigned but are not used in computing students' GPA. These include:

Grade	Significance
CR	Credit
NC	No Credit
I	Incomplete
W	Withdrawal
AUD	Audit

1 1995-97 University Catalog, page 52 (Attachment 3)
2 Ibid., page 49.

VI.B. **REQUIREMENTS FOR GRADUATION** (continued)

Academic Probation and Dismissal[3]

A student is placed on academic probation whenever any one of the following conditions is met:

(1) Cumulative GPA falls below 2.0.

(2) Semester GPA for two consecutive semesters is less than 2.0.

(3) Student is on semester trial, as defined by the dean's office.

Any student who is on academic probation normally should not enroll for more than 13 credit hours nor fewer than twelve credit hours.

A student may be academically dismissed whenever any one of the following conditions is met:

(1) A student fails 50% or more credit hours in any semester.

(2) The student's dean determines that academic performance at the end of a probationary semester does not warrant the student's continuation.

(3) The student's GPA falls below the minimum:

FSU Credit Hours Graded	FSU Cumulative Minimum GPA
0 to 20.9	1.40
21 to 30.9	1.60
31 to 50.9	1.70
51 to 67.9	1.80
68 to 97.9	1.90
98 +	1.99

If a course is repeated, then the higher of the two grades stands.

C. **Times of graduation**
How often and when are students graduated during the year?

Students are graduated three times each year. Commencements are held at the end of Fall semester in December, at the end of Winter semester in May, and at the end of the Summer session in August.

D. **Evening and/or cooperative programs (if applicable)**
Briefly describe the administrative and academic procedures utilized to supervise evening and/or cooperative programs and to coordinate them with day programs. Especially explain differences and effects on graduation.

N/A.[4]

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3 1995-97 University Catalog, page 53 (Attachment 3).

4 The program being evaluated, A.A.S. in Mechanical Engineering Technology, is not offered as part of any evening or cooperative program.

VI. REQUIREMENTS FOR GRADUATION (continued)

E. Bachelor's degree

If a bachelor's degree in engineering technology is offered, explain if it is an integrated four-year program, or if it is an extension of an associate degree program. Are credits from other ABET-accredited programs accepted? Are credits from any other programs or institutions accepted? Explain fully.

The bachelor's degree offerings at Ferris State University in engineering technology are extensions of associate degrees. There are several programs in the College of Technology that approximate integrated four year programs: Computer Networks and Systems, Plastics Engineering Technology, Surveying Engineering, and Construction Management.

Credits are accepted in those programs from other ABET-accredited programs as well as from programs that are not ABET accredited. Only credits that are a direct substitute for courses required by the degree are accepted as a part of the degree. Any deficiencies are made up before the student is allowed to proceed if the deficiency is in a pre-requisite course. In other cases the student is allowed to make up the deficiency at any time prior to graduation.

VII. JOB PLACEMENT SERVICES

Describe the institution's placement services and other assistance available to students and graduates in seeking employment. Include the size, qualifications, and experience of the placement staff and the extent of service available. Describe what records of initial placement are kept and provide data indicating the success of placement activities.

The Office of Career Planning and Placement Services (CPPS) is a centralized operation serving students and alumni in all Schools and Colleges at the University.[5] The services available through this office include on-campus recruiting programs, job search and career planning assistance, alumni placement services, and career information resources. CPPS is staffed by a director plus three clerical personnel. A part-time para-professional is also employed in this office.

Follow-up studies are conducted for each graduating class.[6] Also, from time to time the College of Technology surveys its alumni.

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5 Appendix J: Career Planning and Placement Services.

6 A Study of 1994-95 Graduates and Their Starting Salaries (Attachment 4).

VIII. ENROLLMENT AND DEGREE DATA

Give below enrollment figures for the fall term of the current academic year (1995-96), other past periods as indicated, and undergraduate degrees conferred during preceding year (1994-95). List day, co-op, and evening programs separately, where appropriate.

Comments, if any:

Enrollment data for programs were not available by Freshman year, Sophomore year, etc. The enrollments were each assigned to one of three categories: Associate degrees programs (AAS), Bachelor's degree programs (BS), and Undeclared.

The most recent enrollment data available was for the 1995-96 school year.[1] The most recent graduation data available was for the 1994-95 school year.[2]

Degrees conferred off campus are included in the on-campus figures.

During the last five years there have been changes in the program offerings of the College of Technology. New programs, minors, and certificates are being offered, a few programs have changed their names, and some programs have been discontinued.

New Programs

B.S. in Computer Networks and Systems (to start Fall 1996)
B.S. in Quality engineering Technology (to start Fall 1996)
Certificate in Construction Administration (started Fall 1995)
Certificate in Project Management (started Fall 1995)
Certificate in Quality (started Spring quarter 1993)
Minor in Facilities Management (to start Fall 1996)

Program Name Changes

Manufacturing Tooling Technology (was Machine Tool Technology)
Heavy Equipment Technology (was Heavy Duty Engine Technology)

Discontinued Programs

Aerial Mapping
Automotive Machine Technology (effective Fall semester 1996)
Avionics
Construction Engineering Technology
Technical Illustration (effective Fall semester 1996)

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1 Ferris State University Fact Book 1995-96, pages 37, and 50-52 (Attachment 1).
2 Ibid., pages 62-64.

VIII. ENROLLMENT AND DEGREE DATA - College of Technology (continued)

Engineering Technology Program	Enrollment by Degree in Engineering Technology						Degrees Conferred		
	Current (Fall 95)		One Year Ago (Fall 94)		Five Years Ago (Fall 90)		94-95	94-95	94-95 Other
	AAS	BS	AAS	BS	AAS	BS	AAS	BS	(Explain)
1. AUTOMOTIVE DEPARTMENT									
Automotive Body	43		45		55		7		
Automotive and Heavy Equipment Management		68		82		121		37	
Automotive Machine Technology	8		22		32		9		
Automotive Service Technology	129		130		175		40		
Heavy Equipment Service Engineering Technology		2		12		81		6	
Heavy Equipment Technology	107		72		9		10		
Pre-Auto Service Technology	3		3		0				
Pre-Heavy Equipment Technology	1		2		0				
Total	**291**	**70**	**274**	**94**	**271**	**202**	**66**	**43**	
OFF-CAMPUS									
Automotive and Heavy Equipment Management		6		0		6	[included above]		
Off-Campus Total		**6**		**0**		**6**	[included above]		
DEPARTMENT TOTAL	**291**	**76**	**274**	**94**	**271**	**208**	**66**	**43**	
2. CONSTRUCTION DEPARTMENT									
Aerial Mapping	0		0		4		0		
Architectural Technology	75		76		171		12		
Building Construction Technology	55		67		105		23		
Civil Engineering Technology	18		23		0		6		
Construction Engineering Technology		0		0		30		0	
Construction Management		99		63		46		26	
Construction Management Transfer		8		24		0		0	
Facilities Management		21		25		22		14	

VIII. ENROLLMENT AND DEGREE DATA - College of Technology (continued)

Engineering Technology Program	Enrollment by Degree in Engineering Technology						Degrees Conferred		
	Current (Fall 95)		One Year Ago (Fall 94)		Five Years Ago (Fall 90)		94-95	94-95	94-95 Other
	AAS	BS	AAS	BS	AAS	BS	AAS	BS	(Explain)
HVACR Engineering Technology		45		50		34		16	
HVACR Technology	62		67		99		19		
Pre-Architectural Technology	23		20		0				
Pre-Building Construction Technology	16		21		0				
Pre-Civil Engineering Technology	4		4		0				
Pre-Construction Management		4		2		0			
Pre-Facilities Management		4		2		0			
Pre-HVACR Engineering Technology		3		3		0			
Pre-HVACR Technology	17		15		0				
Pre-Surveying Engineering		2							
Pre-Surveying Technology	1		1		0				
Surveying Engineering		79		82		70		27	
Surveying Technology	36		27		14		8		
Total	**307**	**265**	**321**	**251**	**393**	**202**	**68**	**83**	
OFF-CAMPUS									
Construction Management		16		13		7	[included above]		
Facilities Management		9							
HVACR Engineering Technology		20		14		0	[included above]		
Surveying Engineering		0		0		0	[included above]		
Off-Campus Total		**45**		**27**		**7**	[included above]		
DEPARTMENT TOTAL	**307**	**310**	**321**	**278**	**393**	**209**	**68**	**83**	
3. **ELECTRICAL/ELECTRONICS DEPARTMENT**									
Avionics	0		0		1		0		
Elect/Electronics Engr. Technology		66		67		49		26	
Industrial Electronics	68		57		105		10		
Pre-Elect/Electronics Engr. Technology		3		1		0			

VIII. ENROLLMENT AND DEGREE DATA - College of Technology (continued)

Engineering Technology Program	Enrollment by Degree in Engineering Technology						Degrees Conferred		
	Current (Fall 95)		One Year Ago (Fall 94)		Five Years Ago (Fall 90)		94-95	94-95	94-95 Other (Explain)
	AAS	BS	AAS	BS	AAS	BS	AAS	BS	
Pre-Industrial Electronics Technology	14		14		0				
Total	**82**	**69**	**71**	**68**	**106**	**49**	**10**	**26**	
OFF-CAMPUS									
Industrial Electronics	0		0		0		[included above]		
Elect/Electronics Engr. Technology		9		9		0	[included above]		
Off-Campus Total	**0**	**9**	**0**	**9**	**0**	**0**	[included above]		
DEPARTMENT TOTAL	**82**	**78**	**71**	**77**	**106**	**49**	**10**	**26**	
4. GRAPHIC ARTS DEPARTMENT									
Pre-Printing Management		0		1		0			
Pre-Printing Technology	0		1		0				
Printing Technology	85		101		155		30		
Printing Management		46		48		47		26	
DEPARTMENT TOTAL	**85**	**46**	**102**	**49**	**155**	**47**	**30**	**26**	
5. MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT									
Manufacturing Engineering Technology		49		53		48		30	
Manufacturing Tooling Technology	36		27		67		13		
Mechanical Engineering Technology	59		49		57		8		
Plastics Technology	109		120		184		60		
Plastics Engineering Technology		93		80		88		52	
Pre-Mechanical Engineering Technology	6		8		0				
Pre-Manufacturing Tooling Technology	4		2		0				
Pre-Plastics Engineering Technology		37		29		0			
Pre-Plastics Technology	33		41		0				
Pre-Product Design Engr. Technology		2		4		0			
Pre-Technical Drafting & Tool Design	2		2		0				

VIII. ENROLLMENT AND DEGREE DATA - College of Technology (continued)

Engineering Technology Program	Enrollment by Degree in Engineering Technology						Degrees Conferred		
	Current (Fall 95)		One Year Ago (Fall 94)		Five Years Ago (Fall 90)		94-95	94-95	94-95 Other (Explain)
	AAS	BS	AAS	BS	AAS	BS	AAS	BS	
Product Design Engr. Technology		43		63		40		29	
Quality Technology		0		2		0		0	
Technical Drafting & Tool Design	71		74		108		22		
Technical Illustration	3		15		51		5		
Welding Technology	54		57		61		16		1 Certificate
Welding Engineering Technology		39		37		31		19	
Total	**377**	**263**	**395**	**268**	**528**	**207**	**124**	**130**	**1 Certificate**
OFF-CAMPUS									
Manufacturing Engineering Technology		60		74		36	[included above]		
Manufacturing Tooling Technology	0		0		2		[included above]		
Plastics Engineering Technology		5		9		0	[included above]		
Product Design Engr. Technology		18		36		0	[included above]		
Quality Technology		5							
Off-Campus Total	**0**	**88**	**0**	**119**	**2**	**36**	[included above]		
DEPARTMENT TOTAL	**377**	**351**	**395**	**387**	**530**	**243**	**124**	**130**	**1 Certificate**
UNDECLARED	**75**		**154**		**30**				
ON-CAMPUS TOTAL	1217	713	1 317	730	1483	707	365	319	
OFF-CAMPUS TOTAL	0	148	0	155	2	49	[included above]		
COLLEGE OF TECHNOLOGY TOTAL	**1217**	**861**	**1 317**	**885**	**1 485**	**756**	**298**	**308**	**1 Certificate**
FERRIS STATE UNIVERSITY TOTAL	**9 767 Headcount 7 882 Total FTE**		**10 258 Headcount 8 356 Total FTE**		**12 076 Headcount 10 704 Total FTE**		**948**	**1 661**	**11 Certificate 34 MS 40 D. Optom. & D.Pharm.**

IX. FOLLOW-UP ACTION ON PREVIOUS TAC OF ABET VISIT

If this is a reaccreditation visit, list the institutional requirements and recommendations for corrective action that were made and indicate what has been done to respond to each of them. [It is not necessary to list suggestions for improvement, but important improvements should be noted.] Actions in response to program requirements and recommendations are to be reported in Volume II.

N/A.

X. OBJECTIVES AND SELF-APPRAISAL OF THE ENGINEERING TECHNOLOGY UNIT

The purpose of this section is to provide guidance for the faculty and administration of the engineering technology unit in making a detailed self-appraisal. In order to be of value it is essential that the topics listed be developed fully in an expository manner.

A. The community

Describe the surrounding community from an economic or industrial viewpoint. What is the industrial base and its potential for future growth? Substantiate the description with significant statistical data. Describe the employment outlook for present and future graduates of the institution in general and engineering technology specifically [three pages maximum].

Ferris State University is located in Big Rapids, Michigan. Big Rapids is located in west central lower Michigan and has a population of 12,000 (not including Ferris enrollment). The surrounding area is primarily agricultural with some light industry. The largest employer in the immediate vicinity is Ferris State University. Much of the industrial base is in support of the major automobile manufacturers. Evart Products supplies many plastics parts to Chrysler/Jeep. Nartron supplies a variety of electrical parts to the automotive industry. Fitzsimons supplies gas tank filler tubes to the major auto manufacturers. Big Rapids Products does metal stamping and finishing, chrome plating and buffing for the automotive industries. Federal Screw manufactures automotive bolts.

The potential for future growth in the Big Rapids area is good. Big Rapids has a variety of natural resources readily available, specifically natural gas and water. It is situated close to a major north-south thoroughfare, US 131. The airport, recently expanded with the addition of a new 5000 foot runway, has ample space for hangars.

Ferris State University supplies graduates to western Michigan and beyond. Many graduates are placed in southern Michigan and adjacent states: Indiana, Illinois, Ohio, and Wisconsin. Ferris serves business and industry across the United States. While general employment for college graduates is more difficult today than it was ten or twenty years ago we find that the technology graduates from Ferris fare well. There is a trend for companies to hire graduates who have the "hands-on" practical experience that engineering technology gives them. The technologist is prepared to "hit the ground running." Ferris has a reputation for preparing graduates with the skills needed for entry level jobs as well as preparing them for future advancement. The Technology Transfer Center (TTC) of the College of Technology is integrally linked with the industrial community giving the faculty and graduates an avenue from academia to industry.

B. History of the engineering technology unit

Trace the growth of the engineering technology unit including information on TAC of ABET accreditation. Discuss the development of the present method of financial support and its adequacy [three pages maximum].

X.B. OBJECTIVES AND SELF-APPRAISAL OF THE ENGINEERING TECHNOLOGY UNIT (continued)

The Big Rapids Industrial School was founded in 1884. In that same year the name was changed to the Ferris Industrial School. In 1894 the first trade program was offered under the new Telegraphy Department. The name of the school was changed again in 1899 to Ferris Institute. Starting In 1946 there arose a demand for continued education by veterans of World War II. In that year a broad program of trade and industrial education was launched. In 1950 Ferris Institute ceased to be a private institution and became Ferris State College. In 1956 the Trade and Industrial Division was established and 16 programs were offered. The Trade and Industrial Division and the Collegiate Technical Division merged to form the School of Technical and Applied Arts in 1964. Four years later the School reorganized into six departments: Automotive, Construction, Electrical and Electronics, General, Graphic Arts and Industrial. The associate degree program in mechanical engineering technology was initiated in 1970. By 1972 twenty-five associate's, two bachelor's and six certificate programs were being offered. The School of Technical and Applied Arts was renamed the School of Technology in 1983. In 1987 Ferris State College become Ferris State University and in 1988 the School of Technology was renamed the College of Technology. Presently, the College of Technology offers 29 technically oriented programs including associate and bachelor degree curricula in automotive and heavy equipment, construction, electrical/electronics, graphic arts and manufacturing engineering technologies.

In 1950 when the institution changed from private to public it began to rely on state funding as well as tuition and fees and gifts and grants from private individuals and industry. That is still the method of financial support. In recent years, there has been a steady decline in state support as a percentage of the total budget requirements. This has been made up in part by an increase in tuition. The College is relying more and more on grants, cash gifts, equipment donations and consignments of large pieces of equipment. As long as the University continues to maintain its strong programs it should expect to retain adequate funding. The College of Technology expects to prosper, with income supplemented by gifts, donations and equipment consignments.

ABET accreditation has been obtained for the following programs within the College of Technology:

B.S. Surveying Engineering, 1987/1994
Initially RAC/ABET, then EAC/ABET

B.S. Electrical/Electronics Engineering Technology, 1994-95
TAC/ABET

In 1993 the B.S. in Construction Management program was approved for accreditation by The American Council for Construction Education.

C. Mission and goals

Describe the mission and goals of the institution and how the engineering technology unit assisted the institution in meeting its goals. Discuss the institution's view of what constitutes engineering technology and its place in the educational spectrum [four page maximum].

X.C. OBJECTIVES AND SELF-APPRAISAL OF THE ENGINEERING TECHNOLOGY UNIT (continued)

The Statement of Mission[1]

Ferris State University's mission is to teach students in a number of applied technology fields and in other selected professional fields where there is sustained and significant career potential. Ferris educates its students to be employable and capable of professional growth, and further, to contribute to their profession and to a constantly changing, global society.

Our Students
We are committed to providing our students with strong curricula emphasizing practical, usable skills blended with a relevant general education foundation. This is accomplished in a caring environment with personal attention and close faculty-student interaction. We offer education opportunity, with an "open door" admission component, to a diverse array of students, including high school graduates, transfer students from other colleges and universities, as well as non-traditionally prepared students. We also foster positive co-curricular experience leading to a fulfilling student life.

Our Programs
We are committed to keeping our education programs and services responsive to the changing need of manufacturing, business, health care and other industries and professions which are critical to Michigan's economy. We achieve this by actively fostering mutually beneficial relationships with those who employ our graduates.

Our Employees
We are committed to high standards of performance and pride in accomplishment, with the understanding that the strength of our organization is our people. We embrace the concepts of equal opportunity, affirmative action and cultural diversity. We encourage teamwork, professional growth, acceptance of responsibility, and recognition for achievement.

Our Communities
We are committed to being good neighbors with full participation in community life and community service. We share access to educational experience, business opportunities, cultural events, leisure pursuits and a variety of other activities with our communities.

Our State
We are committed to contributing to the economic vitality of our state by providing a well trained and educated work force. We are actively involved in applied research relative to the transfer, application and management of technology, and its relationship to our society.

Goals of the University

(1) To produce graduates immediately employable in their chosen fields in a diverse array of technical and professional programs important to Michigan and its economy.

(2) To combine technical and professional education with a liberal arts studies foundation: Together, these will provide students the opportunity to obtain the skills and knowledge, high ethical standards and a sense of responsibility. These attributes are needed for success in both their careers and in their roles as citizens in a diverse and changing world.

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1 1995-97 University Catalog, pages 8-9 (Attachment 3).

X.C. OBJECTIVES AND SELF-APPRAISAL OF THE ENGINEERING TECHNOLOGY UNIT (continued)

(3) To cultivate among students active learning, critical thinking, information literacy and problem solving skills

Objectives for the College of Technology in Support of the University's Mission and Goals

(1) To provide A.A.S. and B.S. graduates the skills and knowledge to be employable and advance within their field of study and improve their educational options after graduation.

(2) To serve the part-time student through outreach activities such as those offered at the Applied Technology Center (ATC), Grand Rapids, Michigan.

(3) To supply experience and application to support conventional lecture and lab-based instruction through interning and co-op activities, plus senior capstone courses in each academic program.

(4) To develop a sense of professionalism within the student by encouraging professional student association activities within the student's chosen field of study.

(5) To furnish applied research for business and industry and faculty development projects via Technology Transfer Center (TTC) activities. Such activities would include training, product development, manufacturing process improvement, and prototype development.

(6) To improve recruitment and retention. Currently the College has a committee developing recruitment material. Each department has a recruiting agenda and faculty and staff participate.

Our view of engineering technology

Engineering technology is that discipline that lies in the professional spectrum between the engineer and the technician or industrialist. The curriculums are built on the model promoted by ABET. The specialty areas are less math intensive than engineering but still include mathematics through applied calculus. The curriculums are more applications oriented than theory oriented. The graduate from technology also should be versed in a variety of general education areas including cultural enrichment and social awareness. Written and spoken communications are an important part of the engineering technology curricula.

D. Recruitment

Describe means used to inform potential students of the availability of engineering technology programs, and the relative advantages of each. Include the size, qualifications, and experience of the recruitment staff, the methods and media used in recruiting, and the recruitment staff's relations with secondary schools, civic groups, or community colleges [two pages maximum].

Recruiting is done primarily by the admissions counselors from enrollment services. Enrollment services visit many high schools, career centers, and community colleges on an annual basis. They are recruiting for the university at large. Staff and faculty from the various colleges, departments and programs within the University also take part in recruiting activities.

Methods used for informing potential students are visits as described above and personal mailings. Some programs use the ACT-EOS to obtain listings of prospective students who have indicated an interest in a specific program.

X.D. OBJECTIVES AND SELF-APPRAISAL OF THE ENGINEERING TECHNOLOGY UNIT (continued)

Many contacts are made as a result of referrals from former graduates, parents, relatives, and friends. These are accomplished by phone, when possible, and then followed up with mailed material.

E. Strengths and weaknesses

List what are considered the significant strengths and limitations of the engineering technology unit and its relation to the institution. With each limitation list any contemplated corrective action. Describe present long-range plans as they relate to the engineering technology unit and the engineering technology programs as a group; discuss factors relating to enrollment trends, employment outlook, any projected revision of objectives and anticipated physical facility changes.

Significant strengths

(1) The College of Technology employs a well qualified faculty which include registered professional engineers and members of professional organizations. Typically, faculty members have significant prior industrial experience. Many do outside consulting work which helps them remain current.

(2) The faculty are committed to teaching. Research conducted within the College of Technology is of an applied nature and usually is performed through the Technology Transfer Center. Faculty members dedicate their major efforts to teaching. All faculty in the Mechanical Engineering Technology program are full-time.

(3) Advising ranks high in the eyes of the faculty and the staff. Each faculty member is assigned a group of students for whom they are responsible (unless they change programs). Faculty and students meet at least once each semester to discuss their progress and resolve potential problems.

(4) The faculty and staff enjoy excellent physical facilities. The laboratories are sized for efficiency, safety, and comfort. The equipment is of the latest models and types giving the student the most up-to-date instruction. That equipment that is not new is very functional and affords the student the necessary instruction to make them competitive in the job market.

Most of the College of Technology faculty offices were relocated to a remodeled former dormitory in 1988. The offices are roomy and are equipped with 486 or pentium computers tied to a LAN network. This gives access to laser printer stations and to the College of Technology and University networks as well as to the Internet. The faculty are provided with e-mail addresses.

(5) The programs enjoy strong industrial ties. This relationship leads to significant equipment donations and consignments. It allows the programs to develop special workshops and training sessions for industry through the TTC or through the Applied Technology Center (ATC) in Grand Rapids.

(6) The programs all have industry advisory committees. These committees have exhibited a strong commitment to their respective program and take an active part in insuring proper content in each of the programs. They also often are instrumental in helping obtain equipment and in aiding with student recruitment.

(7) The students are generally dedicated and career oriented. The College of Technology students are interested in the applications and are willing to "get their hands dirty." Graduates get jobs because of their education and the willingness to work.

X.E. OBJECTIVES AND SELF-APPRAISAL OF THE ENGINEERING TECHNOLOGY UNIT (continued)

(8) Students in the College of Technology have opportunities to belong to a student chapter of a professional organization. Typical professional societies that relate to programs in the College include the Society of Manufacturing Engineers (SME), Institute of Electrical and Electronic Engineers, Society of Plastics Engineering, American Welding Society, and Burt and Mullet (surveying engineering students). These chapters allow students to be introduced to their industries, attend trade shows, workshops, seminars, and state and national meetings. The chapters sponsor the annual College of Technology technical symposium where industry representatives are invited to speak about their work.

Limitations

(1) Funding is becoming more difficult. For example, in 1988 the state's funding was approximately 63% of the University's total revenue. In 1994 it was 49%. On the other hand, revenue from tuition has significantly increased from 35% in 1988 to 45% today. Certainly this funding change puts more burden on the College of Technology to raise revenue in other ways.

(2) Due to demographics in the State of Michigan, there have been fewer high school graduates each year during the last decade. This makes competition for students stiffer. Partly due to the increased tuition costs at Ferris and other colleges and universities, some students are electing to go to their nearby community college for the first two years. This tends to reduce the potential enrollments for our freshman and sophomore classes. Fortunately, this decline has ended. It is expected that high school enrollments in Michigan will steadily increase over the next decade.

(3) Our geographic location in a rural setting is somewhat limiting. There is not on hand a nearby large pool of students. Our programs rely on students who commute or are from some distance. With this type of student population it is difficult to offer week-end, evening and summer classes.

We believe that the strength of our programs and placement of our graduates will overcome these limitations.

Enrollment is anticipated to remain steady for the College of Technology over the next 10 to 15 years. Enrollment from program to program will vary with the demands of business and industry.

Our dedication to continuous improvement will include ongoing reviews and reassessments of these objectives. The College of Technology must remain flexible and be ready to adjust and to respond to the changing needs of industry, the students, the University, and the State of Michigan as changes take place.

NCA STATEMENT OF AFFILIATION STATUS

North Central Association of Colleges and Schools
Commission on Institutions of Higher Education
NCA 30 North Lasalle Street, Suite 2400 (312) 263-0456; (800) 621-7440; Fax (312) 263-7462
Chicago, IL 60602

STATEMENT OF AFFILIATION STATUS

FERRIS STATE UNIVERSITY
Big Rapids, MI 49307

(Effective July 17, 1995)

Status:	Accredited (1959- .)
Highest degree awarded:	Doctor's.
Most recent action:	July 17, 1995.
Stipulations on affiliation status:	None.
New degree sites:	No prior Commission approval required for offering existing degree programs at new sites within the state.
Progress reports required:	October 1, 1995, 1996, 1997; A report on the actual income and expenditures of the previous fiscal year and the budgeted income and expenditures for the current fiscal year. March 1, 1996; A report on assessment of student academic achievement.
Monitoring reports required:	None.
Contingency reports required:	None.
Other visits required:	An evaluation in 1997-98 academic year focused on (1) the financial stability of the institution, (2) the general education program of the institution, and (3) the institution's program to assess student academic achievement.

071795

NCA STATEMENT OF AFFILIATION STATUS

Last comprehensive evaluation: 1994-95.

Next comprehensive evaluation: 2000-01.

071795

FSU/FFA CONTRACT PROVISIONS - SABBATICAL LEAVE

10.4 Sabbatical Leave

A. PURPOSE - Sabbatical leave is to encourage members to pursue special studies, investigations, and research that will contribute to their professional development and competence.

B. ELIGIBILITY - A member may apply for sabbatical leave after the completion of ten (10) semesters of continuous full-time employment, excluding summer. The sabbatical leave may take place any time following the completion of the twelfth semester of continuous full-time employment, excluding summer.

A recipient of a sabbatical leave is eligible for a subsequent sabbatical leave only after again fulfilling all of the above requirements, with time of employment being calculated from the date of return from the previous sabbatical.

C. DURATION - The duration of sabbatical leave shall be determined by the validity of the request and the needs and resources of FSU. Sabbatical leaves may be granted for one or two semesters or twelve (12) consecutive months but shall not exceed the period of time for which the applicant is regularly appointed. Under special circumstances, determined by the needs of the applicant and the interests of FSU, a sabbatical leave of two or more non-consecutive semesters may be granted so long as the total period on leave does not exceed the period of time for which the applicant is regularly appointed.

FSU/FFA CONTRACT PROVISIONS - SABBATICAL LEAVE

D. **SABBATICAL REVIEW COMMITTEE** - Each unit may elect a sabbatical review committee consisting of at least three (3) tenured members or one (1) tenured member from each unit elected by the members of that unit, whichever is greater. Counselors and librarians are one "unit" for purposes of this section and, as a unit, are entitled to elect one (1) member from the unit to serve on the all University sabbatical review committee, established in paragraph H of this section. Each unit sabbatical review committee may publish the guidelines it follows to rank order sabbatical leave requests.

E. **APPLICATION** - Applications requesting sabbatical leave shall be submitted to the member's Sabbatical Review Committee and a copy shall be given to the member's department head on the University's official form, on or before October 15 of the year preceding the academic year for which the leave is being requested. The application form shall, in addition to other pertinent data, contain adequately detailed plans of the proposed professional activities during the sabbatical leave.

The applicant shall consult with the department head during development of a sabbatical leave proposal consistent with the goals and objectives of the unit involved.

F. **EVALUATION OF APPLICATION** - The unit Sabbatical Review Committee shall:

1. Evaluate applications against published committee guidelines.

2. Rank order the sabbatical requests which have met the sabbatical leave application guidelines.

3. Forward the rank order list to the appropriate dean by November 15.

4. Provide a written explanation to any member whose request is not recommended.

The University has no liability in the event there is no unit sabbatical review committee or in the event such committee fails to meet its responsibilities.

Mechanical Engineering Technology

Accreditation Report 1996-1997

Section 2 of 2

FSU/FFA CONTRACT PROVISIONS - SABBATICAL LEAVE

G. **REVIEW BY DEAN** - The dean shall review the rank list and may make deletions. Upon written request, the dean will give a written explanation to any member whose request is deleted. The dean shall forward this list to the all University sabbatical review committee by December 1.

H. **ALL UNIVERSITY SABBATICAL REVIEW COMMITTEE** - Each unit may elect one (1) member from its sabbatical review committee to serve on the all University sabbatical review committee which reports to the VPAA.

This Committee shall determine a rank ordering of all requests forwarded by the deans and deliver it to the VPAA by January 15.

The University has no liability in the event there is no all University sabbatical review committee or in the event such committee fails to meet its responsibilities.

I. **REVIEW BY VPAA** - The VPAA may delete from the committee's rank order but may not alter the order.

Upon written request, deletions by the VPAA in the rank ordering will be discussed with the all University sabbatical review committee and, upon written request will be explained in writing to the affected individual(s) with a copy to the all University sabbatical review committee

J. **BOARD OF TRUSTEES** - The list shall be submitted to the Board of Trustees.

K. **COMMITMENT TO RETURN** - Before a sabbatical leave is granted, the recipient must agree in writing that in the event (s)he fails to return to employment at FSU at the expiration of such leave and render services for a period of at least one (1) year thereafter in the same capacity as when the leave started, the member will reimburse FSU for all sums paid by FSU while on leave. The sums paid by FSU may be withheld by the University from sums owed to the recipient, if any.

L. **COMPENSATION AND BENEFITS** - Compensation will be two/thirds of regular salary for the period of sabbatical leave and shall be paid according to University payroll procedures.

FSU/FFA CONTRACT PROVISIONS - SABBATICAL LEAVE

Sabbatical leave is full-time service for the purposes of computing length of service, salary, promotions, assignments, sick leave, insurance, retirement, and other benefits accruing to full-time service for which they would normally be eligible were they not on approved leave.

M. **TERMINATION** - A sabbatical leave may be terminated before its expiration date upon mutual agreement between the recipient and FSU.

N. **SABBATICAL REPORT** - During the first semester following the recipient's return to FSU, (s)he must submit to the unit Sabbatical Review Committee and department head copies of a written report, of professional quality, outlining his/her experiences and achievements consistent with the purposes for which the leave was granted. The department head and the unit Sabbatical Review Committee will forward, with evaluative comments, the report to the President, via the dean and the VPAA. A copy shall be filed in the FSU Library, and a copy shall be submitted to the All University Sabbatical Review Committee. One copy of this report, with all attached comments as well as any submitted rebuttal thereto, shall be retained in the recipient's personnel file.

The written report, with all evaluative comments, shall be available to all evaluating and/or decision making personnel for purposes of subsequent sabbatical leaves, promotions, and/or merit determinations.

FACULTY DEVELOPMENT GRANTS

MEMORANDUM

TO: Tenured and Tenure-track Faculty

FROM: Professional Development Committee

DATE: October 30, 1995

SUBJECT: Professional Development Grants

This document contains:

1. *Information* about the Professional Development Grants;
2. *Guidelines* for submitting Professional Development Proposals;
3. *Dates* for *submitting* proposals;
4. *Dates* awards will be *announced*;
5. *Dates funding* will be available.

	Proposal due	*Results announced*	*Date funded*
First grant period:	December 8	February 29	March 8
Second grant period:	March 15	April 30	May 10

To apply for one of these grants ***submit nine (9) copies*** of the proposal to:

Professional Development Committee
Academic Senate Office
Bishop Hall 415

by ***10:00 am*** on Friday, ***December 8, 1995***, or by ***10:00 am*** on Friday, ***March 15, 1996***.

For more information, contact one of the committee members below:

Committee Member	*Office*	*Ext.*
Richard Bearden	LIB	2055
Gerald Calkins	BUS 336	2456
Jeffrey Christafferson	HF 331	2585
Paul Hoeksema	BIS 524	2707
James Hoerter	HF 318	2550
Chryl Irvine	JH 108	2778
John Jameson	PHR 308	774-6655
James Paramore	PEN 407	2178
Robert Speirs	PLT 104	2964

FACULTY DEVELOPMENT GRANTS

Ferris State University
Faculty Development Grants
1995-96

The Faculty Development Grants are intended for educational research, innovation, and experimentation. They are designed to encourage and support faculty competence and excellence in teaching. The types of proposals particularly invited are those which:

1. Increase faculty competence by acquiring new teaching skills, updating instructional techniques, or pursuing recent advances in a discipline;
2. Involve research on the art and science of teaching;
3. Develop, implement and evaluate innovative or alternate approaches to classroom instruction; and
4. Develop disciplinary or departmental courses or curriculum changes which exceed normal teaching responsibilities.

Eligibility

Any member of the board-appointed faculty is eligible to submit a proposal.

Criteria for Evaluation

1. The purpose of the proposal must be central to the educational mission of Ferris State University.
2. There must be reasonable expectation that the project can be completed within the specified time period and with the resources requested;
3. Priority will be given to those projects likely to be continued beyond the initial funding period;
4. Projects that have wide applicability will be favored;
5. There must be a clear definition or statement of the project and goals of the project;
6. Requests for dollar amounts is not limited, but the number of competitive proposals may restrict awards. (Total funds available for all grants = $30,000.)

Review Process

Evaluation of proposals will be made by a committee of faculty appointed by the Academic Senate. Where appropriate, faculty and staff with expertise related to the proposal may serve as consultants to the committee.

Application Procedure

All proposals must include a cover page and additional supporting materials, including:

1. A concise statement of the nature of the problems or project to be undertaken;
2. A list of the objectives to be achieved;
3. A plan for accomplishing the objectives;
4. An evaluation plan for the project;

FACULTY DEVELOPMENT GRANTS

5. A time schedule for completion of the project;
6. A proposed budget with justification described in the body of the proposal;
7. A list of other grants, both internal and external, related to this project that have been received in the last two years and other grants applied for and grants that will be applied for that relate to this project. Provide:
   a. Name of grant(s)
   b. Date received/applied for
   c. Amount of grant(s)
8. An up-to-date curriculum vitae for the principal investigator(s);
9. A summary of the impact of the project on the educational process at Ferris State University.

Cover Page

The cover page should contain only the following information in the order indicated:

FERRIS STATE UNIVERSITY
Proposal for a Faculty Development Grant

Title:

Investigator(s): *

Affiliation: (Department and/or College)

Abstract: (100 words or less)

Administrative Acknowledgement: **

Funds Requested:

Proposed Starting and Completion Dates:

Final Report

A final report on the project must be submitted to both the Academic Affairs and the Academic Senate Office no later than three months from the proposed termination date. *(If a stipend is part of this grant, one-third will be withheld until the final report is received.)*

The Final Report should contain the following:

1. A cover page;
2. A detailed description of completed project activities;
3. Any publications of papers presented as a result of the project;
4. A listing of project activities that have been incorporated into course syllabi or curricula; and,
5. Plans for future activities related to the project.

*Two copies must be signed by the applicant(s).
**The department head and/or dean must sign the same copies signed by the applicant(s).

TIMME CENTER FOR TEACHING EXCELLENCE

TIMME CENTER FOR TEACHING EXCELLENCE

Office of Academic Affairs
Bishop 405
Extension 2300

1996-97

In 1988, the Timme Center for Teaching Excellence was initiated at Ferris State University in honor of Abigail Timme, a 1912 graduate from Ferris' Secretarial Studies curriculum, who generously contributed to Ferris as an alumna. The primary purpose of the Center is to encourage and support improvement of teaching and learning at Ferris State University. Representing a part of the University's commitment to excellence in teaching, the Center will take a proactive role to achieve the following goals:

- To facilitate instructional improvement efforts of faculty;
- To enhance student learning;
- To serve as a professional development resource for all those interested in the teaching/learning process; and
- To enhance the institution's reputation for excellence at the local, state, and national levels.

The Timme Center for Teaching Excellence is organized as a resource unit under the Vice President for Academic Affairs. An advisory committee was established to guide and formulate policy. The 1996-97 Timme Center Advisory Committee members are:

John Landis, Chair	Allied Health	2283
Chuck Bonning	Technology	2358
Julie Doyle	Business	2385
John Vanderploeg	Arts & Sciences	2547
Dale Hobart	Support Services	3885
Ron Jacoby	Pharmacy	2235
Sharon Octernaud	Academic Affairs	3794
Randy Vance	Optometry	2092
Tom Oldfield	Academic Affairs	2300

During FY96-97 the Timme Center for Teaching Excellence will continue to provide additional resources to faculty for exploring new concepts, ideas, teaching methodologies, and instructional delivery systems. Two types of grants will be available: (1) Mini-Travel Grants and (2) Instructional Assistance Grants.

TIMME CENTER FOR TEACHING EXCELLENCE

MINI-TRAVEL GRANTS
1996-97

Purpose

The Mini-Travel Grants are intended to support faculty travel that cannot, by nature of the expense, be normally supported through travel budgets of the various schools. The grants may include travel to attend workshops, seminars, and other related activities that promise to contribute to the participant's professional development. Maximum grant awards are ***$400.***

Application Procedures

Requests for Mini-Travel Grant funds may be submitted to the Timme Center for Teaching Excellence, Bisop 4, and must include a cover sheet (Attachment A), a *copy* of a completed Request for Institutional Travel form with appropriate signatures from the department and college, a brief statement explaining how the requested travel funding will assist in the participant's professional development, and a statement of support from the department head/program director. A maximum of two travel grants may be funded for a single event. A Mini-Travel Grant application can be submitted to the Office of Academic Affairs no sooner than the beginning of the semester prior to the requested travel (example: winter travel applications can be submitted at the beginning of fall semester). If a portion of the travel expense is being funded by the department and/or college, budget codes with maximum dollar amounts should be included on the request.

Application Dates:

For Fall 1996 Travel: Applications will be accepted beginning May 13, 1996.

For Winter 1997 Travel: Applicatons will be accepted beginning August 26,1996.

For Summer 1997 Travel: Applications will be accepted beginning January 6, 1996.

Eligible Recipients

Full-time, Board-appointed faculty and program coordinators.

TIMME CENTER FOR TEACHING EXCELLENCE

ATTACHMENT A

Timme Center for Teaching Excellence

Office of Academic Affairs
Bishop 415
Extension 2300

FY 96-97
Mini-Travel Grants

Please attach Justification Statement

APPLICANT	**Name:**
	Title:
	Campus Address:
	Campus Telephone:
	College/Department:

ACTIVITY	**Type:** [] Seminar [] Conference [] Workshop [] Course
	Title:
	Date(s):
	Destination(s):
	Amount Requested: **Account #:**

SIGNATURES	**Applicant:**
	DepartmentHead/Dean Approval:
	Academic Affairs Approval:

TIMME CENTER FOR TEACHING EXCELLENCE

INSTRUCTIONAL ASSISTANCE GRANTS
1996-97

Purpose

Instructional Assistance (IA) Grants seek to improve the quality and diversity of the instructional delivery of the University's academic programs. Grants will be offered in two major areas:

1. Special assistance in instructional delivery systems, including teaching strategies, audiovisual aids, testing, and instructional technology; and
2. Workshops/seminars that develop faculty competence in new delivery systems or teaching techniques.

It should be noted that this grant program specifically excludes content-related requests. These requests should be directed to the Professional Development Grant Committee. Research projects unrelated to instructional delivery should be directed to the Faculty Research Committee.

Application Procedures

Grants are competitive, and will be awarded based on their ability to promote innovative teaching techniques, to apply new instructional technologies, and to facilitate flexible instructional patterns. The grants can support individual faculty or team efforts to significantly strengthen existing or new curricula. Each proposal should include:

1. The educational significance of the project for students, the department, and the discipline,
2. The estimated time frame for completion of the project,
3. A detailed budget of expected expenses,
4. A description of new skills to be acquired by the participant as a result of the project; and
5. A description of the evaluation mechanism that will be used to judge the educational impact of the project.

Grants will be awarded annually on a first-come, first-served basis. There is a $3,000 maximum awarded for each grant. *Stipends are not an allowable expense as part of an Instructional Assistance Grant.* Proposals may be submitted beginning July 1, 1996 for funding in FY 96-97. As IA grant proposals are submitted, the committee will meet to review and approve the grants.

Once a grant has been approved, the funding will be transferred into a departmental account. Therefore, the appropriate account number needs to be indicated on the cover sheet (Attachment B).

Report Procedures

A report to include a one-page summary in abstract form, the results of the evaluation conducted and an accounting of the funds spent (expense vouchers and receipts) is to be submitted to the Timme Committee within one year of receipt of the grant. Unspent allocations will be returned to the Timme Committee unless an extension request has been received and approved by the committee.

Eligible Recipients

Permanent, Board-appointed teaching faculty and program coordinators.

ATTACHMENT B

Timme Center for Teaching Excellence

Office of Academic Affairs
Bishop 415
Extension 2300

FY 96-97
Instructional Assistance Grants

APPLICANT	**Name:**
	Title:
	Campus Address:
	Campus Telephone:
	College/Department:

ACTIVITY	**Type:**
	Title:
	Date(s) (Begin-End):
	Destination(s): (for grants requiring travel)
	Amount Requested: **Account #:**

SIGNATURES	**Applicant:**
	DepartmentHead/Dean Approval:
	Academic Affairs Approval:

TIMME CENTER FOR TEACHING EXCELLENCE

Examples of Successful Timme Center Instructional Assistance Grant Applications

CD-ROM for MSDS Access Brad McCormick College of Allied Health Sciences

$1000 awarded for the purchase of 2 CD-ROM drive units to be used for access to the Material Safety Data Sheets (MSDS) produced by the Department of Defense on CD-ROMs. The units will be housed in the Timme Library for access by students, faculty and staff. Students enrolled in Hazardous Material Control and Management will use the data base for class assignments.

Item Banking and Testing Software Fran Miller College of Allied Health Sciences

$2588 awarded for the purchase of software and a site license for *ParTest.* The software is installed on the Allied Health network for faculty to use as a test development, test item-banking and student test delivery system. The project included a seminar for faculty interested in using the system.

Multimedia Music Instruction Donald Flickinger College of Arts and Sciences

$3000 awarded for the purchase of a multimedia computer system and workshop/ travel expenses to introduce a system for the production of instrumental practice tapes for avocational instrumental music students and enhancement of Cultural Enrichment classes.

Videodisc Workshop - "Slice of Life" Jack Buss College of Arts and Sciences

$700 awarded for attendance at a multimedia workshop with tutorials on the use of the "Slice of Life" videodisc in biology and medical education. The videodisc was purchased as part of the Timme Technology System Grant awarded to the Biology and Physical Science Departments in 1993. Knowledge gained will be used for development of interactive supplemental instruction in anatomy and physiology courses.

Mathematics Instruction Using Computers Betty Arnold, Gene Arnold & Phil Stich College of Arts and Sciences

$2895 awarded for the purchase of a color portable computer, extra monitor, and software for classroom use in teaching mathematics on-campus and at extension sites. The system will be used for demonstrations and problem-solving activities in the classroom.

An Integrated Sales and Inventory System Lianne Bracken College of Business

$3000 awarded for the purchase of software and some hardware to be used for the introduction of inventory/sales and nutritional analysis via computers by Food Service students. This award is being used in conjunction with State of Michigan Vocational Education monies to fully fund the project. Students will gain state-of-the-art skills in food service management.

TIMME CENTER FOR TEACHING EXCELLENCE

Multimedia Statistics Instruction — Sidney Sytsma — College of Business

$3000 awarded to fund the purchase and integration of multimedia hardware and software into the instruction of statistics. Purchases included: CD-ROM, video capture card, video overlay card and *Podium* as the software for presentations.

Leisure Services Planning and Problem-Solving Computer Applications — Susan Hastings-Bishop — College of Education

$2600 awarded for a training seminar, technical support, and computer software (Computer Aided Design and Geographical Information System). Students will be able to develop skills using state-of-the-art computer software for planning, design, and natural resource management in leisure services.

How to Use the Lensometer — Fred Nista — College of Optometry

$1500 awarded for the purchase of hardware and software to produce a computer-assisted instruction package for the use of optometric technician students. The package will use still video, text and voice.

Autonomic Pharmacology Tutorial — Richard Hult — College of Pharmacy

$250 awarded for the purchase of software to develop an animated tutorial for student or lecturer use to demonstrate the principles of autonomic pharmacology.

Successful Key Strategies for Planning & Teaching Automated Manufacturing — James Rumpf and Gary Ovans — College of Technology

$1200 awarded to attend a workshop to introduce faculty to several new skills, including curriculum integration in manufacturing, development of new course cognates, and establishing partnerships with industry and business.

FACULTY RESEARCH GRANT PROGRAM

Proposal Guidelines - Revised March, 1996

The Faculty Research Grant Program has been established by the university to provide support for board-appointed faculty interested in engaging in research. All board-appointed faculty (that is, tenured and tenure-track faculty) are eligible to apply. It is expected that faculty who are granted support through the Faculty Research Grant Program will successfully complete a noteworthy project or progress to a sufficient extent so as to qualify for continuing long-term support from an outside source.

The Faculty Research Committee and the Academic Affairs Office will provide information and assistance to faculty who wish to apply for research support from governmental agencies, foundations, other private organizations, or alumni funds. This section explains the procedures to be followed in requesting support from the Faculty Research Grant Program.

General Information

The Faculty Research Grant Program is designed to provide assistance to faculty for research grants for up to one year in length. *If necessary, a faculty member may request an extension of the award period for an additional six (6) months.* Requests for such extensions must be submitted in writing to the Faculty Research Committee no later than 90 days prior to the end of the grant period.

Items for which support may be requested include:

- Secretarial
- Student wages
- Materials and supplies
- Travel costs, meals and lodging (if essential to the research)
- Contractual/technical services
- Equipment

Few restrictions are placed on the types of research projects acceptable for review. However, the following projects, regardless of their value and content, are not within the purpose for which the Faculty Research Grant Program was established:

Grants to faculty members for the purpose of completing graduate course work.

Projects aimed primarily at the improvement of courses, course materials and content. Funds for the support of such projects may be requested through grants for Professional Development.

FACULTY RESEARCH GRANT PROGRAM

The Proposal Document

1. *Title Page*
   The title page should contain only the following information in the order indicated. The original must be signed by the applicant and the appropriate administrators(s).

   FERRIS STATE UNIVERSITY
   Proposal for a Faculty Research Grant

   Title:

   Initiator: (include signature)

   College or Department:
   - Administrative acknowledgment (signature of department head, supervisor, or dean)
   - Funds requested
   - Proposed beginning and ending dates
   - Date submitted

2. *Abstract*
   A separate page to follow title page. A brief summary of the proposal (200 words or less). At the top of the page, list the following:
   Title
   Date submitted

3. *The Proposal*
   This is the actual proposal. It should be clear, concise, complete, and brief. Proposals should be printed on 8-1/2x11" paper, stapled at the left margin. Do not bend or enclose in folders. Submit the original with 3 stapled complete copies of the entire proposal and 8 additional copies of the abstract page.

   The proposal will follow the following outline as applicable.

   Objective. State the overall objective or long-term goal of the proposed research.

   Background. Review the most significant previous work and describe the current status of research in this field. Document with references. Describe any preliminary work the applicant has done which led to this proposal.

   Rationale. Present concisely the rationale behind the proposed approach to the project.

   Methods and Procedure. Give details of the plan for research. Include a description of the study design and data collection, the methods to be employed, the kinds of data or information expected to be obtained, and the means by which these data or information will be analyzed or interpreted. Specify any statistical techniques that will be used.

Describe the procedures in the sequence in which it is planned to carry them out. Indicate a tentative schedule of the main steps of the investigation within the project period.

The methods should be given in full and complete detail so that the committee can assess their feasibility and validity. If there are any aspects of the design that for legitimate reasons cannot be specified until the research is underway (e.g., parameters that must be determined in a pilot study) those unspecifiable aspects must be noted, with a detailed explanation of how they are to be determined (e.g., specify the methods of the pilot study).

If clinical studies are involved, give details of responsibility for patient selection and patient care. If the proposed research involves human subjects, it must be submitted concurrently to the Institutional Review Board (Human Subjects Committee). Include with your proposal evidence that you have submitted your proposal to the Institutional Review Board. Also, notify the Faculty Research Committee chair when the Institutional Review Board has approved your proposal, since the Faculty Research Committee will not fund an unapproved project. If there are animal subjects, the above procedure must be followed with the Animal Care and Use committee.

Each item requested in the budget should be alluded to in the methods section in a manner that clearly justifies the item as essential to the proper execution of the proposed research.

Significance. Comment on the potential importance of the proposed work to the scientific/academic community and to Ferris. Discuss any novel ideas or contributions which the project offers. Comment on the potential for future expansion of the project. Comment on how this project will contribute to any plans you may have to solicit future outside funding.

Facilities. Describe the facilities available for the project. List major items of equipment available for the work. If special campus equipment or facilities are required, arrangements must be made prior to submission of the proposal.

Collaborative Arrangements. If the proposed project requires collaboration with other institutions, describe the collaboration and provide evidence of assurance that the institutions involved agree.

Personnel. Prepare concise biographical sketches for all professional personnel involved in the project. This information is used by the review committee to evaluate the adequacy of the project staff. List in reverse chronological order the individual's professional background and employment. List present research support for each individual. Provide for each individual a chronological list of all, or the most representative, of his or her publications. List authors in the same order as they appear on the publication, the full title, and the complete reference as these usually appear in books and journals. The complete biographical sketch, including bibliography, should not exceed three (3) pages for each individual.

FACULTY RESEARCH GRANT PROGRAM

Prior Grant Summary. List, in chronological order, any research funds received or currently under review related to this, similar, or related research, provided the amount exceeded $500. You must include source, purpose, exact amount, and funding period. Also, specify the details of each grant's budget sufficiently to make clear to what extent, if any, the present budget proposal overlaps with or compliments the previous grant. If you previously received a Ferris Faculty Research Grant, attach a copy of your final report to the committee.

Budget. Budget items should be listed in detail according to the budget form attached and may include appropriate items as listed in the section on General Information. For travel expenses, please list food and lodging separately from transportation costs. Also, list separately each leg of a trip that has several destinations. At the end of an award period or extension, unexpended funds will revert to the Faculty Research Fund.

4. *Reports* The Project Director is responsible for all reports and communications with the Faculty Research Committee. The first named individual on all grant requests involving more than one faculty or professional staff member will be named as the Project Director.

A final report must be submitted for each project as early as possible, but, in any event, within three months of the termination of the grant or extension period. Failure to submit a report will preclude acceptance of future applications. If it is not possible to undertake an approved project, a report to this effect should be submitted as early as possible to the Vice President of Academic Affairs with copies to the appropriate Dean, Department Head, and Chair of the Faculty Research committee.

The report is to be succinct and written for an intelligent lay audience (i.e., without any unexplained jargon). It is to consist of the following:

1) The original abstract, updated to reflect the actual execution of the project.
2) A one-page synopsis of the literature and background evidencing a need for the research done.
3) Any further methodological information essential to the interpretation of the remainder of the report.
4) A one-page summary of the findings.
5) A one-page discussion of the implications, conclusions, and potential applications derivable from the findings.
6) A paragraph indicating future research enabled by the findings.
7) A paragraph indicating the public forum in which the findings are to be presented.

FACULTY RESEARCH GRANT PROGRAM

GENERAL CRITERIA FOR FUNDING RESEARCH PROPOSALS

Faculty Research Committee 1996-97

MINIMUM CRITERIA FOR CONSIDERATION

The following criteria must ALL be met before the proposal will be considered for funding.

1. The proposal constitutes an example of research rather than some other form of project.
2. All parts of the proposal are stated clearly, precisely, and completely, and in accordance with these guidelines. *
3. There is a sufficient literature search, indicating a grounding in theory.
4. The personnel are qualified.
5. Sufficient facilities, equipment, and supplies will be available to complete the project.
6. The personnel have demonstrated that the project can be completed in the time available.
7. The budget is reasonable and appropriate relative to the impact and significance of the project.
8. The methods for collecting and analyzing data are clearly stated, objective, and appropriate to the objective and design of the study. Sources for calculation and research designs are cited as appropriate.

RELATIVE CRITERIA

The projects that meet the above minimum criteria will be rank ordered on their relative merit according to the following criteria:

1. The project should have an anticipated contribution to the scientific/academic community and to Ferris that is (A) significant, and (B) likely to accrue. The project should have a clear potential to lead to further research projects. A potential to lead to outside grants will be evaluated more favorably.
2. The budgeted items should be essential to the appropriate completion of the project. (Items that are merely facilitative will be ranked lower.)

*During the evaluation process, the committee reserves the right to request written or oral elaboration and clarification of any aspects of submitted proposals which it deems to warrant further scrutiny. However, it is the responsibility of the applicant to submit a clear and complete application in the first place.

All deliberations of the committee are strictly confidential.

FACULTY RESEARCH GRANT PROGRAM

FERRIS STATE UNIVERSITY
Faculty Research Grant: *Proposed Budget*

Title: ______________________________

Initiator(s): A)______________________ B)______________________
Type name/sign *Type name/sign*

Items for which support is being requested:

	Secretarial		
1600	(List number of hours x rate of pay)	____ x ____ =	1) ____
2100	Benefits (19.3%)		2) ____
		Subtotal =	______
	Student Wages		
1800	(*List number of hours x rate of pay & subtotal	Subtotal =	______
	Materials & Supplies		
3000	(List description, cost, quantity & subtotal of cost)	Subtotal =	______
	Travel Costs		
4000	(List destination(s), costs & subtotal)	Subtotal =	______
	Contractual/Technical Services		
5000	(*List description, costs & subtotal)	Subtotal =	______
	Equipment		
7000	(*List description, costs & subtotal)	Subtotal =	______
		Total	______

*Use a separate page to list information, if necessary

POLICY AND PROCEDURES GOVERNING OUTSIDE CONSULTING ACTIVITIES

From: Personnel -- Page 6.21
Administrative & Support Employees
Board Adopted: March 22, 1991

CONSULTING ACTIVITIES

Outside consulting service may be approved without loss of pay to a maximum amount of ten (10) working days per year in the case of the full-time individual who is employed on an academic-year basis or 13 working days per year for the full-time individual who is employed on a 12-month basis. Written approval from the appropriate vice president must be obtained prior to initiating a consulting arrangement. For such a request to be approved (without loss of compensation), it shall be the responsibility of the vice president to determine that such outside consulting service will be directly or indirectly beneficial to the University and/or will contribute significantly to the public welfare. The 10-day and 13-day limits shall not be cumulative beyond the close of the fiscal year.

Prior to consulting for the University, employees must receive written approval from the responsible vice president and must file a report with the Board of Trustees describing the consulting arrangement.

This policy does not apply to part-time, temporary or casual employees.

FSU/FFA CONTRACT PROVISIONS - TENURE

Section 3 - TENURE

3.1.

A. Tenure is the right to continual employment in a bargaining unit position until voluntary separation from FSU employment, lay-off or termination for just cause under the contractual process in section 4.

B. All employees of FSU awarded tenure prior to the ratification of this Agreement shall retain such tenure.

FSU/FFA CONTRACT PROVISIONS - TENURE

3.2.

A non-tenured member whose official employment date as a member precedes July 1, 1986 is governed by the tenure procedure in effect at time of hire.

3.3 Rights of Probationary faculty who have elected the tenure evaluation system of the 1984-87 agreement

Employees who have elected the tenure evaluation system of the 1984-87 agreement will be covered by sections 3.2 and 3.3 of that agreement.

3.4 University Tenure Policy

A. The tenure policy described in this Agreement applies only to non-tenured members. Tenure shall not be acquired automatically by length of service, but rather through the criteria and procedures set forth in this Agreement. There shall be no arbitrary establishment of a fixed proportion of tenured to non-tenured members by the FFA, FSU or any division(s) thereof. Only continuous appointment as a member shall be counted toward qualification for tenure. However, except in the specific case of FSU administrators, the following applies:

1. One full year's absence, or less, from the bargaining unit but not the University shall not be considered an interruption of continuous service with respect to qualification for tenure.

2. All time in excess of one full year's absence from the bargaining unit but not the University shall, by rounding to the nearest academic semester, correspondingly reduce the time counted toward qualification for tenure previously accumulated in the bargaining unit.

B. The granting of tenure results from a deliberative process involving a department tenure review committee, the department head, the dean, the VPAA, and the President.

FSU/FFA CONTRACT PROVISIONS - TENURE

3.5 Department Tenure Policy and Procedures

Each department/unit shall set policy and procedures for the attainment of tenure within the following guidelines:

A. The tenured members of each department/ unit shall be responsible for:

1. Devising the department/unit policy and procedures for attainment of tenure. The tenured members may elect to include one administrator as a non-voting member in these deliberations. This process may include the establishment of a subcommittee(s).

2. Determining, as part of the policy and procedures, the criteria for attainment of tenure based in part on the following:

   a. Assigned professional responsibilities, such as teaching, advising, counseling, or librarianship;

   b. Professional development, such as research, scholarship, creative endeavors and/or consulting; and,

   c. Service, such as service on committees, service to the student body, service to the profession, and/or professionally related community service.

3. Establishing tenure review policy and procedures for: reviewing the applicant's material, providing for applicant's rebuttal, and evaluating the rebuttal and material. This review must occur prior to submission of the tenure review committee's final recommendations to the appropriate department head/ supervisor.

4. Amending tenure review policy and procedures.

B. Any proposed amendment(s) must be submitted to the VPAA by February 15. The VPAA shall either accept or reject the proposed amendments by April 15. Failure by the VPAA to act upon the submitted amendments within the timeline given shall constitute disapproval thereof and the proposed amendment shall not be effective.

C. The VPAA may impose amendments to the policies and procedures, at any time, only when such amendments are based upon the institutional necessity to conform with federal, state and/or local laws and/or regulations. Amendments imposed under this provision are subject to the grievance procedure of this Agreement as an FFA grievance and shall begin at 9.4. D. Step 4 of such procedure.

D. Amendments to tenure review policies and procedures created under this Agreement shall apply only to those tenure applicants hired after formal implementation of the amendments. Tenure applicants hired prior to the implementation of the amendments may elect to be reviewed by the newly implemented policies and procedures or the policy and procedures otherwise applicable pursuant to this Agreement. Selection of amended policy and procedures by a member shall not extend his/her tenure-track period.

E. Until such time as approved and/or imposed, tenure review policy and procedures are implemented pursuant to this Agreement, however, present policies and procedures will remain in effect.

3.6 <u>Evaluation and Reappointment/Non-reappointment of Tenure-Track Faculty</u>

A. Except as provided in 3.7 A, prior to the attainment of tenure, all board-appointed members shall be on a tenure-track appointment. Tenure-track appointments are renewable appointments of an academic year or twelve (12) months in length.

B. Except as provided in 3.7 A, all new members must serve a tenure-track period prior to applying for tenure. The tenure-track period shall commence with the first fall semester of a member's tenure-track appointment. A tenure-track member must apply for tenure no later than his/her fifth academic year. Failure to apply for tenure consideration shall result in denial of tenure. A tenure-track member with an initial academic rank of instructor or assistant professor may not apply for tenure prior to his/her fifth year. A tenure-track member with an initial academic rank of associate professor may not apply for tenure prior to his/her fourth year. A tenure-track member with an initial academic rank of professor may not apply for tenure prior to his/her third year.

C. During his/her first semester of tenure-track appointment and prior to any evaluation, the non-tenured member shall receive, in writing, the effective department/unit tenure and evaluation policy and procedures. The chair of his/her department/unit tenure review committee shall provide this document. This department/unit policy and procedures shall provide a basis for the decision to renew tenure-track appointments and shall provide a basis for determining the attainment of tenure itself.

D. All non-tenured members shall be observed by at least one tenured faculty member of the tenure review committee during the fall and winter semesters of each year, with the exception of the year tenure is requested.

E. The tenure-track member shall be evaluated annually by the department/unit tenure review committee by November 1 of his/her second and subsequent years of service. Although the tenure review committee evaluation process begins in the second year of employment, the tenure review committee may, at its option, do a written evaluation during the first year of a tenure-track member's service. These evaluations shall include recommendation for reappointment or non-reappointment.

F. At each of these annual evaluations, the member shall be afforded an opportunity to submit to this committee any documentation to support his/her continued tenure-track appointment. The tenure review committee will advise the tenure-track member of its preliminary evaluations and recommendation for reappointment or non-reappointment by November 1. The tenure-track member shall be afforded an opportunity to meet with the tenure review committee to discuss its preliminary recommendation. Such meeting shall take place by November 15. The tenure review committee will forward in writing the final evaluation and recommendation to the tenure-track member and the appropriate department head/supervisor by November 20.

G. The tenure-track member shall be evaluated annually by the appropriate department head/supervisor in a manner consistent with Section 3.5.A.2. The department head/supervisor will provide a written copy of the evaluation and recommendation to the member by December 10.

H. The decision to grant or deny the first tenure-track reappointment rests solely with the VPAA. All subsequent reappointment decisions require affirmative recommendations by both the appropriate tenure review committee and the VPAA. However, failure by the tenure review committee to file its recommendation with the department head/supervisor in a timely manner shall constitute complete concurrence with the decision of the VPAA with regard to reappointment or non-reappointment of the tenure-track member.

I. The timetable for formal notice of reappointment/non-reappointment shall be as follows:

1. Not later than March 15 of the first year of service.

2. Not later than January 15 for each subsequent year except for the year tenure is requested.

J. In the case of non-reappointment, the specific reasons for denial shall be cited in writing.

K. In the event the tenure review committee and the VPAA concur in recommending non-reappointment or do not concur, reappointment is denied, provided that a member may appeal to the President, as follows:

1. In the event the tenure review committee and the VPAA recommend against reappointment, the appeal is limited to a claim that the contractual and/or department/college procedures were not followed.

2. In the event that either the tenure review committee or the VPAA recommend against reappointment, the appeal is not limited to procedures.

3. The appeal must be in writing, be delivered to the office of the President on or before April 15 for members in their first year of service and February 15 for each subsequent year. The appeal must state the specific reasons for the appeal.

4. The decision of the President is final, binding and not subject to arbitration.

L. The failure of the tenure review committee to comply with any of its obligations under section 3 is exempt from the grievance process and FSU shall have no liability because of such failure.

3.7 Attainment of Tenure

A. Administrators or faculty hired by FSU who have held faculty tenure at another post secondary institution accredited by a recognized accrediting entity may, in the discretion of the President of FSU, be granted tenure upon hire. The President of FSU may ask for input from the faculty in the department in which the person is placed in a bargaining unit position before tenure is granted. The person hired is subject to section 7.8 upon the commencement of bargaining unit work.

B. As to members not granted tenure under paragraph A, by October 1 of the tenure decision year, the member must (1) apply for tenure and (2) present evidence in support of his/her application.

C. By November 1, the tenure review committee will advise the applicant of its evaluation and intended recommendation. By November 15 the applicant may request a meeting with the tenure review committee which shall be scheduled as soon as reasonably possible. The final recommendation of the tenure review committee shall not be made until after the meeting.

D. The tenure review committee shall prepare a written report, with all supporting documents, containing its recommendations. This report need not include the committee deliberations or a personnel specific record of the vote. The written recommendation shall be one of the following:

1. Grant tenure, beginning with the start of the University's next academic year.

2. Grant one additional non-tenured year during which the applicant must fulfill specific conditions in order to be eligible for tenure. Upon completion of that conditional year, the tenure application process will again be followed. In the event of denial of tenure,

employment will be terminated at the end of the academic year in which tenure is denied.

3. Deny tenure and terminate employment at the end of the next regular academic year.

E. By December 15, the final report and recommendation by the committee together with supporting data shall be presented to the department head and to the tenure applicant.

F. Failure by the tenure review committee to timely deliver its recommendation to the department head constitutes concurrence with the decision of the VPAA.

G. The department head shall attach his/her evaluation and recommendation and forward all material to the dean. The dean shall forward the recommendations and supporting documentation to the VPAA and may append his/her recommendation and evaluation. Neither the department head nor the dean may change the tenure review committee's recommendations.

H. By March 1, the VPAA shall notify, in writing, all applicants for tenure of his/her decision. Failure by the VPAA to act on the tenure review committee recommendation constitutes his/her recommendation for the denial of tenure.

I. If either the VPAA or the tenure review committee recommends the granting of an additional non-tenured year, that year is granted. A member can be granted only one extension of the non-tenured period. When the tenure review committee recommends the granting of tenure and the VPAA concurs, upon approval by the President, tenure is awarded. In all other cases, tenure is denied.

J. A member denied tenure may appeal the decision in writing to the President of FSU by March 15. The President, following a review of the tenure materials, shall communicate in writing his/her decision to either grant tenure, deny tenure, or grant one additional non-tenured year, provided that such a year has not previously been granted. The decision of the President is final, binding and not subject to arbitration.

K. The failure of the tenure review committee to comply with any of its obligations under section 3 is exempt from the grievance process and FSU shall have no liability because of such failure.

TENURE POLICY - MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

College of Technology
Manufacturing Engineering Technologies Department
TENURE POLICY

I. ***Tenure Attainment Criteria***

A. The primary professional goal of a faculty in the Manufacturing Engineering Technologies Department is to attain Excellence in Teaching.

1. Teaching

The candidate shall demonstrate superior qualities as a teacher as evidenced by:

a. Student opinion relating to faculty performance supported by a departmentally approved student evaluation that addresses, as a minimum, the elements in appendix A.
b. Statements by peers relating to an individual faculty member's instructional performance and depth of understanding in his/her subject area. See appendix B.
c. Statements by the candidate's department head regarding instructional competency. See appendix C.
d. Development of new or existing programs, courses and teaching methods.
e. Teaching awards.

2. Advising

a. Ability to deal with student problems and opportunities.
b. Student counseling and advising.
c. Special tutor assistance to students.
d. Advisor to student organizations.

B. These activities will enhance a Candidate's consideration for tenure:

1. Scholarly activities including:

a. Publications of books or monographs
b. Serving as a journal referee
c. Professional certification or registration (where applicable)
d. Serving as a member of a certifying board
e. Consulting with professional agencies
f. Developing new course techniques
g. Developing new or improving existing program
h. Course analysis and development
i. Submitting grant or contact proposals
j. Participating in continuing education as a lecturer, author, or as a developer of other educational materials
k. Serving as a member of a school or program evaluation team
l. Other activities deemed worthy by the unit
m. Consulting and/or work in business and industry

2. Service activities including:
   a. Service on the Faculty Senate
   b. Service on University committees
   c. Administrative responsibilities, program coordinators committee, chairpersons, etc.
   d. Representative of University to governmental agencies, alumni and other organizations
   e. Officers or members of a county, state, national, or international professional organization
   f. Representative for the professional before governmental legislative and other organizations
   g. Department committee work
   h. Assisting in department equipment procurement

II. *Tenure Committee*

A. Candidate's Tenure Committee

1. Each probationary faculty member shall have his/her own Candidate's Tenure Committee until such time as tenure is granted or denied.

2. The Committee shall have three voting members chosen as follows:
   a. the department head shall, after consulting with the department tenure committee, appoint three tenured faculty from the department to serve on the Candidate's Tenure Committee. Appointments will be subject to candidate approval and the consent of the tenured faculty members.
   b. the candidate shall select the Committee chair.
   c. the department head, after consultation with the candidate and the department tenure committee, shall appoint a tenured faculty member to fill any vacancies.

3. The candidate's tenure committee shall provide an annual report to the department tenure committee.

4. The department head may attend any tenure meeting as a non-voting member.

B. Department Tenure Committee

1. The department shall elect a department tenure committee which shall coordinate the actions of the various candidates' tenure committees.

2. The committee shall have a rotating membership of four tenured department members. One department member will be elected/re-elected each year to a three-year term. The committee shall elect a committee chair at the fall meeting.

III. *Procedures*

A. The department head shall provide the following to all new tenure-track faculty members:
   a. a copy of the department tenure policy
   b. the tenure evaluation forms used by the department

B. If new probationary tenure-track faculty have been employed, the department tenure committee shall hold a meeting with these individuals no later than the end of the first full week of classes in October.

C. The department tenure committee shall provide each candidate with a time schedule which lists the required completion dates of each phase in the tenure process.

D. The candidate shall present to his/her tenure committee (on a yearly basis by November l) an up-to-date resume' with particular emphasis on meeting the suggested tenure criteria.

E. The candidate's tenure committee shall request from the candidate's peers, and the department head, completed evaluation forms (presented as additions to this policy) on an annual basis, but no later than the end of the first full week of winter term. Comments will be used in the evaluation of the candidates. The committee may also request student evaluation summaries for each candidate.

F. The department tenure committee shall be provided with a locked file, in the office of the department secretary, for storage of all documents, findings of the committee and those submitted by the candidate's tenure committee, tenured members of the department, and the department head. Committee findings of any tenure-track candidate shall be available for inspection in the department office by any tenured department member.
Candidates shall have access only to their own files in the presence of a member of the candidate's tenure committee. Files shall be purged on an annual basis.

G. The candidate's tenure committee shall maintain a chronology of the status of each non-tenured, tenure-track faculty member.

H. The candidate shall meet yearly until tenure is granted or denied with the candidate's committee and the department head to review his/her progress toward tenure. This meeting shall take place during the spring term.

I. The recommendation to grant or deny tenure shall be based upon a ballot vote of the department's tenured faculty. A simple majority shall determine whether to recommend the granting or denial of tenure.

J. If tenure is granted, the candidate's tenure review file shall be destroyed.

K. If tenure is denied, the candidate's tenure review file shall be kept for an additional three years after the date of denial.

L. If tenure is denied, the candidate has thirty calendar days to submit the appeal and hold another vote. If an appeal vote is not taken within forty-five days of the original denial, the candidate's appeal for tenure shall be considered approved.

IV. *Time Schedule for Tenure Evaluation*

A. By the first department meeting in September, the non-tenured faculty will be introduced, and candidates shall have information on tenure procedure and time-table.

B. By the first week in October the candidate's tenure committee shall have been selected and the first meeting the candidate shall be held.

C. By the first week in November, the candidate's tenure committee shall have completed and approved the candidate's evaluation and tenure procedure.

D. During October to February 1st, the candidate's tenure committee shall gather information, shall observe candidate's classrooms, and shall work on evaluation process.

E. During the spring term, the candidate's tenure committee, the candidate, and the department head shall meet to discuss progress toward tenure. The tenured faculty within the candidate's program shall inform the department head of their assessment of the candidate's progress.

F. By January 15th of the final year of non-tenured status, the candidate's tenure committee shall report its recommendation to grant or deny tenure to the department head and the department tenure committee. The department tenured faculty vote, which grants or denies tenure, shall occur before April lst. The candidate's tenure committee and department head shall jointly inform the candidate of the results. If the recommendation is to deny tenure, denial notification shall be in writing from the department head and the department tenure committee. The candidate's tenure committee and department head shall submit a written report to the candidate, the dean, and the vice president of Academic Affairs.

V. *Principles of Good Teaching*

A. Faculty has concern for the student
Do students sense that the teacher is concerned?

B. Faculty encourages cooperation among learners
Are team activities, group assignments, etc., encouraged?

C. Faculty encourages an active learning environment
Are students involved - or are they merely spectators?

D. Faculty provides prompt feedback
Are tests and assignments returned promptly? Do students understand "where they stand?"

E. Faculty emphasizes time-on-task
Time plus energy equals learning. There is no substitute for time-on-task.

F. Faculty communicates high expectations
Expect more and you will get it. Do students understand that much is expected of them?

G. Faculty respects diverse talents and ways of learning
There are many roads to learning. Does the teacher respect different talents and attempt to promote different ways of learning?

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TENURE POLICY - MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

(Appendix A)

Example of "student reaction card":

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SCHOOL OF TECHNOLOGY

COURSE REACTION

PLEASE COMPLETE THE AREAS BELOW AND BLACKEN THE CIRCLE WHICH INDICATES YOUR REACTION TO EACH STATEMENT ABOUT THE INSTRUCTOR OR INSTRUCTION.

WRITE-INS SHOULD NOT EXCEED BOXES.

INSTRUCTOR

COURSE

SECTION

QUARTER

YEAR

	EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	UNACCEPTABLE
1. MASTERY OF SUBJECT MATTER	④	③	②	①	⓪
2. ORGANIZATION OF COURSE	④	③	②	①	⓪
3. CLARITY OF PRESENTATION	④	③	②	①	⓪
4. STIMULATION OF INTEREST	④	③	②	①	⓪
5. AVAILABILITY FOR ASSISTANCE	④	③	②	①	⓪
6. IMPARTIALITY ON GRADES AND EXAMS	④	③	②	①	⓪
7. CONCERN FOR STUDENT	④	③	②	①	⓪
8. OVERALL QUALITY OF INSTRUCTION	④	③	②	①	⓪
9.	④	③	②	①	⓪
10.	④	③	②	①	⓪

PLEASE WRITE COMMENTS ON THE REVERSE SIDE.

COMMENTS:

(Appendix B)
FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
NON-TENURED FACULTY PERFORMANCE EVALUATION

PEER GROUP EVALUATION INSTRUMENT

PURPOSE: As a full-time board appointed faculty member, you are requested to evaluate non-tenured faculty within your seniority group, a minimum of twice year. Your evaluation is one component of this individual's total evaluation for this period.

Note: Complete this section prior to distribution

1. Faculty member to be evaluated: ______________________________

2. Department: ____________________ 3. Program: ______________

4. Date of employment: ______________ 5. Term/date: ______________

Please comment on this faculty member's:

- mastery of the subject area:

- instructional design skills:

- communication skills:

- contributions to the program:

- participation as a team player:

Would you recommend this individual for continued employment? Yes____ No____

Signature (faculty member completing evaluation) Date______________

RETURN THIS FORM PROMPTLY TO YOUR DEPARTMENT OFFICE

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(Appendix C)
FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT
FACULTY EVALUATION FORM

NAME:______________________________________ DATE: ____________

A. Instructional Role

1. Preparation Comments

The instructor................

a. is following an adopted course outline. Classroom progress is within acceptable timelines.

b. has prepared and is using organized lesson plans. The lesson plans include lesson objectives, methodology, presentation outline and evaluation techniques.

c. has clearly stated lesson objectives that relate to the course goals.

d. has planned an appropriate methodology.

e. has a planned systematic process of evaluation. The evaluation process has been planned before the test, assignment, or quiz is given.

2. Presentation Skills

The instructor....................

a. has good speaking skills. Proper grammar, good diction, and appropriate voice projections are being used.

b. defines the lesson objectives during the introduction. Clearly states the student expectations at the beginning of the presentation.

c. presents the material in a logical manner. The presentation is sequenced in a systematic manner (i.e., simple to complex, established relationships, etc).

d. has control of the classroom (both physical Comments behavior and mental activities).

e. emphasize important points. Uses some method of clarifying and emphasizing the important points.

TENURE POLICY - MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

Comments

f. uses immediate feedback techniques.
Uses direct questions, specific observation techniques or secondary questioning techniques to determine the level of student understanding during the presentation.

g. gives appropriate homework and reading assignments.

h. Individualizes the presentation. Makes remarks or questions to individual students. Relates the material to personal points of reference. Establishes personal eye contact.

i. uses media well.
Blackboard, overhead, slides, etc., are appropriatel used.

j. exhibits an enthusiasm for the subject.

k. uses good summarization techniques. The primary emphasis is on the major points, repeats the sequence or uses review questions to complete the presentation.

3. Lab Skills

The instructor..............

a. exhibits good interpersonal techniques during dedicated lab activities.

b. uses the lab effectively. Assigns, controls, directs appropriate lab activities.

c. effectively grades student projects.

B. Support Roles

1. Advising

The instructor............

a. makes good use of office hours.
Arranges personal meetings with students, meets scheduled hours, encourages students to use office hours.

b. is developing advising skills. Knowledgeable about program, courses, college policies, and procedures, other support services (tutoring, counseling, etc.)

c. has a personal concern for advisees. Demonstrated by personal interest in advisee's progress. Interested in role as mentor.

Comments

2. Special Assignments Role

Comments

The instructor................

a. enthusiastically participates in departmental activities.

b. effectively completes departmental assignments.

3. Professional Development

The instructor................

a. is actively involved in a professional organization.

b. has made serious efforts to increase technical knowledge or capability.

c. has made serious efforts to improve teaching skills.

TENURE POLICY - MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

(Appendix D)

TENURE CANDIDATE COMMITTEE OBSERVATION GUIDE

PRESENTATION:	OBSERVED	NOT OBSERVED	NOT APPROVED
Introduction -			
Continuity	______	______	______
Objectives	______	______	______
Presentation -			
Material logically sequenced	______	______	______
Mental control	______	______	______
Emphasis of major points	______	______	______
Feedback efforts	______	______	______
Individualizes the presentation	______	______	______
Appropriate use of media	______	______	______
Summary -			
Continuity	______	______	______
Reviews major points	______	______	______
Application -			
Appropriate assignment (time-on-task)	______	______	______
Evaluation process explained	______	______	______
General -			
Good speaking skills	______	______	______
Exhibits enthusiasm	______	______	______
Communicates high expectations	______	______	______
Encourages cooperation	______	______	______
Exhibits concern for the student	______	______	______
Exhibits respect for diverse learning styles	______	______	______

OVER

COMMENTS

Strengths:

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Weaknesses:

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RECOMMENDATIONS:

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TENURE POLICY - MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

(Appendix D)

TENURE CANDIDATE COMMITTEE OBSERVATION GUIDE

PRESENTATION:	OBSERVED	NOT OBSERVED	NOT APPROVED
Introduction -			
Continuity			
Objectives			
Presentation -			
Material logically sequenced			
Mental control			
Emphasis of major points			
Feedback efforts			
Individualizes the presentation			
Appropriate use of media			
Summary -			
Continuity			
Reviews major points			
Application -			
Appropriate assignment (time-on-task)			
Evaluation process explained			
General -			
Good speaking skills			
Exhibits enthusiasm			
Communicates high expectations			
Encourages cooperation			
Exhibits concern for the student			
Exhibits respect for diverse learning styles			

OVER

TENURE POLICY - MANUFACTURING ENGINEERING TECHNOLOGIES DEPARTMENT

COMMENTS

Strengths:

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Weaknesses:

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RECOMMENDATIONS:

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FSU/FFA CONTRACT PROVISIONS - PROMOTION

Section 15 - PROMOTION AND MERIT INCREASES

15.1

A. Each college and a group composed of counselors, and librarians shall establish or maintain a promotion committee.

B. Standards for promotion and merit increases in each college and the group shall be established or maintained which shall include teaching; scholarship; service; and advising. Specific standards shall be developed for promotion to assistant professor, promotion to associate professor, and promotion to professor.

C. Promotion standards shall be submitted by each committee to the dean at a time determined by the VPAA . If no standards are timely submitted, there will be no promotions or merit awards in the college or group failing to submit them.

FSU/FFA CONTRACT PROVISIONS - PROMOTION

D. Merit increases are an addition to but not a substitute for advancement in rank. Hence, the criteria and procedures for merit increases are the same as for promotion with the following additions:

1. Merit increases can only be given to those who have been advanced in rank to the maximum rank consistent with their promotion credentials as defined by the appropriate college/group promotion policy.

2. A tenured member is eligible to apply for a merit increase only after a minimum of four (4) years since his/her last advancement of rank or prior merit increase.

3. Consideration will be given only to accomplishments of the applicant since his/her last promotion or merit increase, or date of hire, whichever is more recent.

E. Candidates for promotion shall be provided with written copies of the most recent written standards at the time they declare an intent in writing to the department head to apply for promotion. The standards in effect at the time of a candidate's declaration of intent are those by which the candidate's application must be judged. If promotion is denied the standards in effect at the time of the candidates declaration to reapply shall be used.

F. Each promotion committee shall evaluate the applications and is responsible for transmitting to the dean a rank ordered list of members recommended for promotion or merit increase.

G. The dean shall inform the members of the committees' recommendation and forward a recommendation to the VPAA only if such recommendation is positive. The dean may append additional recommendations for promotion and merit to the list.

H. The VPAA shall form a University-wide promotion committee composed of the chairs of the promotion committees to create a University-wide rank order list of all recommended promotions and merit increases from the deans and shall inform the members of his or her recommendation and forward a recommendation to the President only if such recommendation is positive. The VPAA may append additional recommendations for promotion or merit to the list.

I. If the President approves the recommendation of the VPAA, the VPAA shall notify the member of the President's approval. The President shall then forward a recommendation to the Board of Trustees at its next meeting only if such recommendation is positive. The President may append additional recommendations for promotion or merit to the list.

15.2 <u>Number of Promotions or Merit Increase</u>

A. For any academic year, there shall be at least one promotion or merit increase for each 14 members wide. For any academic year, except as provided in 15.1 c., each college and the group shall have at least one promotion or merit increase.

B. Fractional numbers shall be rounded to the nearest whole number.

15.3 <u>Compensation for Promotions/Merit</u>

Upon promotion, a member shall receive an increase not less than:

Instructor to assistant professor	$1500
Assistant professor to associate professor	$2400
Associate professor to full professor	$3000

Upon receiving a merit award, the member will receive an increase based upon their rank at the time of not less than Twenty Three Hundred dollars ($2,300.00)

The above amounts shall be pro-rated up for twelve (12) month members.

CAREER EDUCATION LEADER

Ferris State University is in its second century as a national leader in career-oriented education. More than 120 educational programs are offered through the schools of Allied Health, Arts and Sciences, Business, Education, Pharmacy, and Technology, and the College of Optometry.

The institution was founded in 1884 by Woodbridge N. Ferris to provide re-training for out-of-work lumberjacks and miners. Today, the University remains true to its original mission by continuing to provide an education relevant to a changing society to all with the motivation and potential to benefit. Instruction in specialized curricula is enriched by liberal arts studies. The University's laddering concept enables students to transfer credits earned in obtaining a two-year degree toward many comparable four-year degree programs.

Ferris has developed a modern, 600-acre campus comprised of 79 educational, administrative, recreational, residential and support buildings. The University is located in Big Rapids, in the heart of west-central Michigan's vacation/recreation country.

Ferris State University is an Equal Opportunity/Affirmative Action employer. The University complies with all applicable laws, including Title IX of the Education Amendments of 1972 and the Rehabilitation Act of 1973, which forbid discrimination in employment, educational programs or admissions on the basis of age, sex, color, race, national origin, handicap, or other prohibited matters.

FERRIS STATE UNIVERSITY

1995 - 96
FERRIS STATE UNIVERSITY/
PLACEMENT OFFICE
INFORMATION

Approximate FSU Enrollment:
9,500

Academic Calendar:
Semesters Ending:
December 15
May 3
June 25 (1st Summer Session)
August 8 (2nd Summer Session)

Placement Interview Periods:
Fall .... October 2 - December 8
Winter .... January 22 - April 26
Summer ...... May 23 - August 2

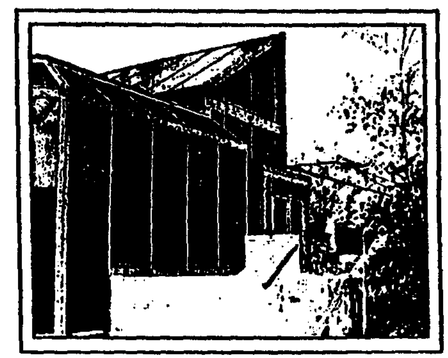
Scheduling Arrangements:
Dan Hurley
Placement Coordinator
Rankin Center, Room 206
Ferris State University
805 Campus Drive
Big Rapids, MI 49307-2226
(616) 592-2683

Office Hours:
8 a.m. - 5 p.m. weekdays

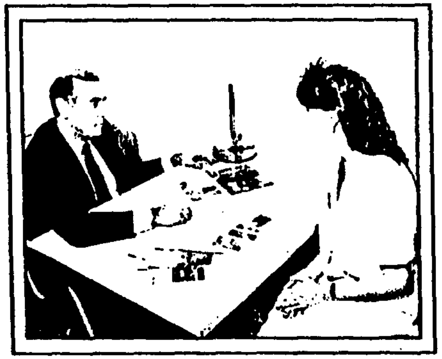
Visitor Parking:
Rankin Center lot

FERRIS STATE UNIVERSITY

PLACEMENT SERVICES



FSU RANKIN CENTER



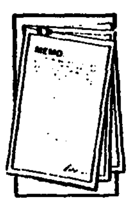
FSU PLACEMENT SERVICES

Your source for qualified applicants

Each year, more than 200 employer organizations schedule campus recruiting visits with Ferris State University's office of career planning and placement services. Organizations planning a recruiting visit are asked to schedule at least three weeks in advance. A pre-screen option is available for employers as long as a second random schedule is also available for students who meet listed qualifications. Employers should forward job descriptions and other appropriate materials prior to the visitation date.

A staff member is available to assist employers in scheduling the most opportune recruiting date(s) for their particular needs. Current recruiting periods and the office contact person are listed on the back of this brochure.

Job Listing Service

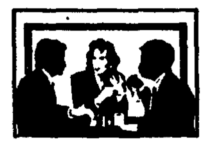


The placement services office publishes a weekly Placement Bulletin which is distributed on campus as well as to alumni registered with the office. Employers are invited to list their career, seasonal and internship opportunities at any time throughout the year. Campus recruiting visits are also announced in the Bulletin.

Internships/ Co-op Education

A great number of programs at Ferris have mandatory or optional intern/co-op learning experiences as part of their curricula. The placement services office functions as a facilitating agency to put intern/co-op employers in touch with the respective faculty coordinators. In addition, many employers find it convenient to use the placement services office for scheduling on-campus interviews with intern/co-op candidates.

Interviewing/ Information Facilities



The placement services office occupies a spacious and attractively decorated area in a recent addition to the University's student union, the Rankin Center.

Interview Rooms - Seven comfortable interview rooms offer pleasant and private settings for interviewing candidates.

Career Library - Career and employer information is available to students through this resource center. Handout materials, as well as permanent reference copies, are regularly maintained. Employers are urged to keep their materials in ample supply and up-to-date.

Video Room - Students have access to a VCR for viewing employer information on half-inch video tapes. Employers who have produced a tape for recruiting purposes are invited to forward a copy to this office. The video room also includes tapes to assist students in developing and improving job search skills.

OTHER EMPLOYER SERVICES

In addition to the services already outlined elsewhere in this brochure, the placement services office also can assist employers with:

- luncheon arrangements with faculty/ staff members
- arrangements for tours of academic labs and facilities
- resume and credential referrals
- requests for curriculum materials and University catalog
- group meetings with students

OVERNIGHT ACCOMMODATIONS

Ferris Inn Motel - across from campus on Business 131 *(616/796-6000)*

Holiday Inn Hotel & Conference Center - between expressway exit 139 and campus *(616/796-4400, ask for "corporate rate" when booking)*

Mechanical Engineering Technology

Response to Accreditation Visitation Report 1996-1997

Section 1 of 3

DESIGN, MANUFACTURING AND GRAPHIC ARTS DEPARTMENT

COLLEGE OF TECHNOLOGY
Ferris State University
EXCELLENCE • HERITAGE • QUALITY • SERVICE • COMMITMENT

MECHANICAL ENGINEERING TECHNOLOGY PROGRAM ASSOCIATE IN APPLIED SCIENCE

Response to

PRELIMINARY VISITATION REPORT

ACCREDITATION BOARD FOR ENGINEERING AND TECHNOLOGY TECHNOLOGY ACCREDITATION COMMISSION

Big Rapids, Michigan 49307

March 24, 1997

FERRIS STATE UNIVERSITY

COLLEGE OF TECHNOLOGY

DESIGN, MANUFACTURING AND GRAPHICS ARTS DEPARTMENT

MECHANICAL ENGINEERING TECHNOLOGY PROGRAM ASSOCIATE IN APPLIED SCIENCE

BIG RAPIDS, MICHIGAN 49307

REPORT

Submitted March 24, 1997

In Response to the

PRELIMINARY VISITATION REPORT

TECHNOLOGY ACCREDITATION COMMISSION
of the
ACCREDITATION BOARD FOR
ENGINEERING AND TECHNOLOGY, Inc.

111 Market Place, Suite 1050
Baltimore, Maryland 21202

PREFACE

Our responses to the TAC/ABET concerns expressed in the Preliminary Draft of the Visitation Report are guided by the policy statement that appears in the explanation of the Visitation Report Format.[1]

> *The operating policy of TAC of ABET has been to base its accreditation actions on the status of the respective program at the time of the on-site visit. However, the Commission has maintained a flexible attitude toward the addition or modification of discrete items, based on conditions altered after the team visit but prior to the Commission's accreditation deliberations. Weaknesses existing at the time of the visit are considered to have been corrected only when the correction or revision has been made effective, is substantiated by official documents signed by the responsible administrative officers, or other evidence required by TAC of ABET is provided. Where action to correct a problem has been initiated but not completed to the satisfaction of TAC of ABET, or where only indications of good intent are given, the action will not be considered in current accreditation deliberations*
>
> *A requirement results from an apparent failure of the program to meet a mandatory provision of the ABET Criteria for Accrediting Programs in Engineering .Technology or applicable program criteria. A recommendation relates to a deficiencies complying fully with some provision of the criteria. The TAC's action will depend on the extent to which the program as a whole falls short of meeting overall standards for accreditation. Suggestions are offered for consideration by the institution to strengthen a program or correct weaknesses which do not constitute violations of the criteria.*

Our reply is organized along the lines of TAC of ABET categories of concerns. Section I addresses *Requirements*, Section II deals with *Recommendations*, and Section III looks after *Suggestions*. Section IV details possible errata or misunderstandings in the TAC of ABET Transmittal Letter and Preliminary Visitation Report.

The Appendices contain various materials and documents that support the actions we have taken to meet TAC of ABET concerns. The References include documents already in the possession of TAC of ABET or attached to this report.

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1 Appendix A: TAC of ABET Transmittal Letter and Preliminary Visitation Report. February 6, 1997. [Received February 10, 1997.]

TABLE OF CONTENTS

VI. REFERENCES

(1) Ferris State University Catalog, 1995-1997 Edition
(2) Fact Book, Ferris State University, 1996-1997 Edition (attached)

I. OUR RESPONSES TO TAC OF ABET REQUIREMENTS

A. PROCESS FOR ADMITTING STUDENTS TO THE MET PROGRAM

There is not a satisfactory reviewing process for admitting students to the Mechanical engineering Technology program. Students can begin the core curriculum without obtaining a minimum level of competency in mathematics. Students should not begin the program until they have completed the MAT 110 [MATH 110] *course. The program is rigorous and has a high attrition in the first year. Much of this is attributed to poor mathematics preparation before starting the program. Section V.G.3. of the ABET criteria requires that proper academic advising be provided to insure that students are adequately prepared to meet the requirements of the program. It is required that the college establish guidelines in the area of mathematics for admission to the Mechanical Engineering Technology program.*

Our admission processes include two parts. First, we establish and maintain admission criteria for our programs, and second, we try to insure that the admission criteria are implemented for incoming students.

The admission criteria for the various programs in the College of Technology for the 1996-97 and 1997-98 academic years are presented in Appendix B. The requirements for freshmen students entering the MET program are stated to be as follows.

1. 2.0 or better high school grade point average (GPA), and
2. 19 or better mathematics ACT score for placement in MATH 116.

Also include are copies of sample admission letters. These documents state each student's admission status. Those who do not meet the first requirement are not admitted to the College of Technology. They may be admitted to the Collegiate Skills program in the University College. (Prior to 1996-97 the Collegiate Skills program was located in the College of Arts and Sciences.)

Those who meet the first criterion but do not meet the second may be admitted to the College of Technology with "pre-technical" status. They are not to enter the regular technical sequence until they have achieved remediation of their mathematics deficiency. Usually, these students require a third year to finish their program. Samples of the communications sent to applicants, notifying them of their status, are also included in Appendix B. Transfer students are evaluated based on their post-secondary records.

These criteria and procedures undergo review on an annual basis at the program and department levels. The admission data for students newly enrolled into the MET program for Fall semesters 1994, 1995 and 1996 are presented in Appendix C. Regular admissions are indicated by the *MECH* designation while pre-technical admissions have the *PMEC* notation.

It should be noted that for a number of years we have been allowing the MET pre-technical students to take MECH 111, our freshman seminar. The purposes for doing this include:

- Providing the pre-technical students with an overview of career choices and identifying for them where the MET program fits in the technical spectrum that includes scientists, engineers, technologists, and industrialists
- Giving those students a chance to network with others who have common interests
- Encouraging them to make a firm commitment to the MET program, or to another program for which they may be better suited.

These students do not, however, matriculate into the MET curricula until they have remediated their math deficiencies.

One problem relating to MET pre-technical (PMEC) students did exist Fall semester 1996. Apparently, there were an insufficient number of seats available in sections of the remedial mathematics courses, MATH 010 and MATH 110. PMEC students registering at the end of the summer were unable to be properly placed.

Within the Mechanical Engineering Technology program the program coordinator and faculty have been instructed to work as a team with the College of Technology Educational Counselor. This will help insure that entering prospective MET students are appropriately classified and registered.

At the University level, a Registration Process committee has been formed. Its structure and mission statement are presented in Appendix D, along with a description of our new University College. Obtaining and allocating resources to meet the needs of remedial students is a major goal of these groups.

B. LIBRARY HOLDING RELATED TO THE MET PROGRAM

While the library is an excellent facility dedicated to the service of students, the specific holdings related to the Mechanical Engineering Technology program (LC TJ section) are outdated and inadequate to support a modern curriculum. Books in the Electrical Engineering Technology section (LC TK) represent an excellent example of current and appropriate materials. Section V.K.5. of the ABET criteria requires library holdings to include a sufficient number of books to support the program. It is required that a program be established to purchase a selection of modern books related to the Mechanical engineering Technology program. The program faculty should be involved at a primary level in the selection of such texts.

Our efforts to improve the MET-related holding in the Timme library have taken a number of directions, as are presented in Appendix E. The primary book acquisition plan is the purchasing system implemented through the Yankee Book Peddlers Approval Plan Services. Slips with currently available titles are circulated to faculty members. The faculty communicate their choices to the liaison librarian for their college. Then books are purchased from budgeted library acquisition funds. Books requested this year by the MET faculty are listed in Appendix E, along with the list of publishers included in the Yankee Book Peddler (YBP) plan.

We also are soliciting donations of books. Recently, 157 books relating to the MET program were received. These are also listed in Appendix E.

The library holding in the mechanical area include some *TA* as well as *TJ* Library of Congress classifications. To clarify the present holding in the Timme library, all the *TJ* and the related *TA* holdings are listed in Appendix F. Also included are lists of the current journal subscriptions in the *TJ* and *TA* classifications.

Also included in Appendix F are the Timme library Index Location Guide and a list of the Michigan Statewide FirstSearch Program databases.

The current Timme library holdings relating to the MET program may be summarized as follows.

TJ Holdings	903
Selection of *TA* Holdings	634
YBP Approval Plan Orders in Hand	94
Gifts from G. Olsson	137
Gifts from C. Drake	20
Total Books	**1858**

II. OUR RESPONSES TO TAC OF ABET RECOMMENDATIONS

A. FACULTY PROFESSIONAL DEVELOPMENT ACTIVITIES

The strength of a program depends heavily on the ongoing professional development activities of its faculty. Some Mechanical Engineering Technology faculty are not participating in professional development activities. Section V.F.9. of the ABET criteria requires that faculty remain current through that active participation in professional societies, continuing education, consulting, etc. It is recommended that a higher percentage of faculty participate in professional development activities.

We are able to report current professional development activities in a number of areas: consulting, meeting presentations, short courses, and membership in professional societies.

1. Consulting Activities

   Recently, George Olsson performed an analysis of a new valve for the Amerikam Corporation. The existing design failed qualification testing at elevated pressures and temperatures. He identified the problem and recommended a design modification. The corrected design succeeded in meeting the test standards. (See Appendix H.)

   Charles Drake, in the last year, carried out a number of finite element analysis (FEA) studies for Brown machine division. These included stress computations for specified loadings in complex machine parts. The structural integrity of the candidate configurations were confirmed. (See Appendix H.)

2. Meeting Presentations

   George Olsson will present a paper titled "A Mechanical Measurements Course as the Capstone for an Associate Degree Program in Mechanical Engineering Technology" at the Annual Meeting of the Michigan Teachers of Mechanics, Grand Valley State University, Allendale, Michigan, April 14, 1997. (See Appendix I for the program listing.)

3. Short Courses

   Charles Drake attended a short course in MOLD FLOW training, held at Moldflow Pty. Ltd., Kalamazoo, Michigan, December 2-6, 1996. The documentation for this activities is presented in Appendix I. He also has been selected to participate in the University's 2nd Summer Faculty Institute, May 13-15, 1997.

4. Professional Society Memberships

   George Olsson recently has applied for membership to the American Society for Engineering Education (ASEE) and to the American Society of Mechanical engineers (ASME). He also has renewed his membership in the Society of the Sigma Xi, an honorary society dedicated to scientific research.

   Charles Drake has renewed his memberships in the American Society for Engineering Education (ASEE), the American Society of Mechanical Engineers (ASME), the American Society for Testing and Materials (ASTM), and the Society of Manufacturing Engineers (SME).

   Messrs. Olsson and Drake also participate in the activities of the Big Rapids, Michigan Chapter of the Michigan Society of Professional Engineers.

B. DISPLAY OF STUDENT WORK FOR MECH 223 THERMODYNAMICS

The display of student work in one course was insufficient for team members to evaluate the effectiveness of this course (MECH 223). Section III.B.1.c.9. of the ABET criteria require that sufficient examples of student work in technical courses be made available to team members. It is recommended that additional examples of student work be made available for the next evaluation visit.

In the current cycle of MECH 223 Thermodynamics and Heat Transfer the instructor is having students maintain course portfolios. These portfolios include all handouts, student notes, homework, and exams. From year to year this practice will be continued. A selection of these items are being copied and archived for the next evaluation visit.

C. COMPUTER APPLICATIONS IN TECHNICAL COURSE WORK.

While there is outstanding computing equipment available at the university, it was not evident that it was being used in a majority of the program technical design courses. Section V.C.6. of the ABET criteria and section VI.N.2.b.4. of the ABET program criteria stresses the importance of the applications of computers in technical course work. It is recommended that more technical course work include applications of computers.

Additions to the computer-oriented course work being made this academic year include the following.

MECH 122 Computer Applications in Technology

To take advantage of the Internet access provided to all Ferris students, a unit of instruction has been added to the current cycle of the course (Winter semester 1997) that involves exploring the ASME internet web site at www.asme.org.

MECH 211 Fluid Mechanics

For electronic spreadsheet applications, Microsoft EXCEL has replaced QUATTRO PRO. Students use this software for laboratory data reduction, graphing, and statistical analysis. The units include single and two variable statistics with least-squares fits by means of linear regression.

MECH 212 Kinematics of Mechanisms

Software applications for mechanism analysis are being reviewed and considered for adoption. See Section III.B. The next cycle of this course will occur Winter semester 1998.

MECH 221 Mechanical Measurements with Computer Applications

The Microsoft EXCEL spreadsheet applications developed in MECH 211 are continued. In addition, the students are introduced to student's t-distribution and t-test for sample data sets. This is accomplished with EXCEL. To better implement the high speed data acquisition equipment and software, the computer in the measurements lab is being upgraded (see Appendix J). Two sets of our existing software for 16 bit high speed data acquisition will benefit:

- Model 2000 A/D Converter Software for Windows 3.1, Measurements Group, Version 1.1, 1994.
- NI-488.2 Software for Windows. For IEEE 488 GPIB Bus, National Instruments Corp., October 1993 Edition.

III. OUR RESPONSES TO YOUR SUGGESTIONS

A. ENCOURAGING STUDENTS WHO COMPLETE THE MET PROGRAM TO SECURE THEIR A.A.S. DEGREE

A large percentage of Mechanical Engineering Technology students continue on to a baccalaureate degree program at Ferris State University and neglect to apply for the Mechanical Engineering Technology associate of applied science degree. More students should be encouraged to undergo this formality to both improve statistics on Mechanical Engineering Technology graduates and also afford graduates the security an associate degree provides in the event they do not complete the baccalaureate program of choice.

The faculty advisors in the MET program have become aware of this problem. They are proactively consulting with students to help them expedite their obtaining A.A.S. diplomas.

Similar action is taking place in the B.S. programs into which many MET students ladder, namely the Product Design Engineering Technology (PDET) and Manufacturing Engineering Technology (MfgET) programs. The necessity of successful completion of the A.A.S. degree for admission into 3rd and 4th year programs is being implemented.

These activities have resulted in an increase in the number of MET A.A.S. degrees awarded from a low of eight in May 1995 to fifteen in May 1996[1].

[1] Ferris State University Fact Book, 1996-97 Edition, page 65.

B. COMPUTER SOFTWARE FOR THE KINEMATICS COURSE, MECH 212

The kinematics course can be improved with the use of computer software such as Mechanimator, Interactive Physics, or Working Model Software. Students appreciate the opportunity to apply computing skills in this type of course.

In the most recent cycle of this course (Fall semester 1996), we introduced a unit of instruction using the Microsoft EXCEL spreadsheet. It was employed to generate motion curves for points on connecting-rod links in four-bar mechanisms. Previously, this was accomplished with QUATTRO PRO.

Presently, we are reviewing "Working Model" and "Interactive Physics" software for use in the course. Because of the recent curriculum revisions, the next cycle of MECH 212 will be offered in Winter semester 1998.

C. INCLUSION OF PROGRAMMABLE LOGIC CONTROLLER (PLC) PROGRAMMING IN THE ELECTRICAL COURSE, EEET 215.

The electrical course should include more work in programmable logic controller programming. The university has excellent donated equipment that makes this very possible.

A new version of EEET 215, Electricity and Electronics for MET students, is being developed by the EEET faculty. The guidelines and requirements for this course are discussed in the memo contained in Appendix K. It is suggested that PLC's be introduced. The first cycle of this new course will occur Winter semester 1998. Also, as part of the course revision a new textbook will be selected.

IV. COMPILATION OF POSSIBLE ERRATA IN TAC OF ABET COVER LETTER AND DRAFT VISITATION REPORT

A. COVER LETTER CORRECTION

On page 2 of your cover letter in the cc list: The wrong person is listed as the MET Program coordinator. The Program Coordinator for the MET Program is *George R. Olsson*, not Phillip P. Marcotte.

B. DRAFT VISITATION REPORT ANNOTATION.

Possible errata or misunderstandings in your TAC of ABET Preliminary Visitation Report are presented in the following table.

Page	Line	Old Text	Replacement Text
3	2nd last		Note that FSU degrees awarded include *D. Optometry and D. Pharmacy*
5	2nd last paragraph, line 2	MAT 110	*MATH 110*
7	1st paragraph, line 2	ATC	*Swan Technical Building*
8	2nd paragraph, line 4	MACH 221	*MECH 221*
9	Line 5	MATL 240	*MECH 240*
9	Last line	programs	*program's*

APPENDIX A

TAC OF ABET TRANSMITTAL LETTER AND PRELIMINARY VISITATION REPORT

ACCREDITATION BOARD FOR ENGINEERING AND TECHNOLOGY, INC.

GEORGE D. PETERSON, Ph.D. P.E.
Executive Director

RECEIVED

February 6, 1997

Dr. Mark Curtis
Interim Dean
Ferris State University
1009 Campus Drive
John Hall 200
Big Rapids, MI 49307

Dear Dean Curtis:

In accordance with current ABET procedures, a copy of the Preliminary Draft of the Visitation Report containing the findings of the team which recently visited your institution is enclosed. Another copy of the Report has been forwarded to your President. Your institution is encouraged to submit written comments regarding changes that have taken place since the visit, or errors in fact that you believe are contained in this Report. Your written response should be sent to the appropriate TAC officials within forty-five days following the receipt of this letter. If the institution agrees with the factual accuracy of the Preliminary Draft Report and has made no changes at the institution that impact the weaknesses enumerated in the Preliminary Draft Report, the Technology Accreditation Commission would appreciate a written statement to this effect.

The following policy statement is cited for your guidance:

"The operating policy of TAC of ABET has been to base its accreditation actions on the status of the respective program at the time of the on-site visit. However, the commission has maintained a flexible attitude toward the addition or modification of discrete items, based on conditions altered after the team visit but prior to the Commission's accreditation deliberations. **Weaknesses existing at the time of the visit are considered to have been corrected only when the correction or revision has been made effective, is substantiated by official documents signed by the responsible administrative officers, or other evidence required by TAC of ABET is provided. Where action to correct a problem has been initiated but not completed to the satisfaction of TAC of ABET, or where only indications of good intent are given, the action will not be considered in current accreditation deliberations."**

In order to facilitate the Commission's action, comments should be limited to matters covered by the enclosed Draft Report, as only those items bear on the potential accreditation of a particular program.

(Cont.)

111 Market Place, Suite 1050, Baltimore, MD 21202 • 410-347-7700 • Fax: 410-625-2238
http//www.abet.ba.md.us

Please provide copies of your response to the following TAC officials:

Team Chairperson (one copy)
Alan C. Dixon
Chairperson
Broome Community College
Box 1017
Binghamton, NY 13902

Editor (one copy)
W. David Baker
Professor
Rochester Institute of Technology
Electrical Engineering Technology Dept.
78 Lomb Memorial Drive
Rochester, NY 14623-5604

Chairman TAC (one copy)
Joseph A. Glad
Supervisor-Substation Engineering
Central Illinois Light Company
300 Liberty Street
Peoria, IL 61602-1404

ABET Office (two copies)
James Ware
Accreditation Director (TAC)
ABET, Inc.
111 Market Place, Suite 1050
Baltimore, MD 21202

Your institution's response will be carefully reviewed by the chair of the visiting team in consultation with the team members. This consultation will form the basis of the draft of the Final Accreditation Report. The draft of the Final Accreditation Report along with your institution's response to the Preliminary Visitation Report will be considered by the Technology Accreditation Commission in its accreditation deliberations. The Final Visitation Report is written based upon the Technology Accreditation Commission's actions and will be provided by ABET with the official notification of the accreditation actions.

ABET considers all Preliminary Draft Visitation Reports to be unofficial documents distributed only for review and comment. Since the enclosed report does not represent the final official views of TAC of ABET, it should be handled confidentially. Release of this document or quotation from it should be limited to those persons determined by the institution to be necessary for the preparation of its response to ABET.

Thank you for your continued cooperation in this matter.

Sincerely,

Joseph A. Glad

Joseph A. Glad
Chairman
Technology Accreditation Commission

JAG/cm

Enclosures: Preliminary Visitation Report
Acknowledgment of Receipt (T52)
Others if appropriate

cc: Above Addresses
Dr. William Sederburg, President
~~Philip P. Marcott~~te, ~~Program Coordinator~~
DR. GEORGE OLSSON, PROGRAM COORDINATOR

DRAFT FOR REVIEW AND COMMENT

ACCREDITATION BOARD FOR ENGINEERING AND TECHNOLOGY

TECHNOLOGY ACCREDITATION COMMISSION

PRELIMINARY VISITATION REPORT

on

FERRIS STATE UNIVERSITY

Big Rapids, Michigan

Dates of Visit:	October 7-8, 1996
Team Chair:	Alan C. Dixon Broome Community College Binghamton, New York

Team Members

Name and Address	Program Visited Degree Granted
Steven C. Wells Old Dominion University Norfolk, VA	Mechanical Engineering Technology Day Program Associate in Applied Science
Swaminadham Midturi Texas A&M University College Station, TX	

EXPLANATION OF THE PRELIMINARY VISITATION REPORT FORMAT

This Preliminary Visitation Report represents the findings of the on-campus evaluation team of the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology. While mention is made of significant institutional and curricular strengths, perceived weaknesses are discussed in greater detail, since these could have an important effect on the ultimate accreditation action. Areas not mentioned in either a critical or salutary manner may be assumed to be judged either as satisfactory or as outside the scope of the visit. The greater emphasis on weaknesses is intended to give the institution the clearest possible explanation of criticisms while reducing the overall content, preparation time and handling of the report after the visit.

The Preliminary Visitation Report is forwarded at this time in order to allow the institution to point out any perceived errors of fact or observation on the part of the visiting team. Significant errors will be corrected in a final version of the report. The report will not be revised to reflect conditions changed by the institution after the visit, except as indicated in the following policy statement.

"The operating policy of TAC of ABET has been to base its accreditation actions on the status of the respective program at the time of the on-site visit. However, the Commission has maintained a flexible attitude toward the addition or modification of discrete items, based on conditions altered after the team visit but prior to the Commission's accreditation deliberations. Weaknesses existing at the time of the visit are considered to have been corrected only when the correction or revision has been made effective, is substantiated by official documents signed by the responsible administrative officers, or other evidence required by TAC of ABET is provided. Where action to correct a problem has been initiated but not completed to the satisfaction of TAC of ABET, or where only indications of good intent are given, the action will not be considered in current accreditation deliberations."

No specific accreditation action should be inferred from this preliminary report. Such action is taken officially by the Technology Accreditation Commission only after consideration of the report and recommendations of the visiting team, the response of the institution to the Preliminary Visitation Report, and any other pertinent information brought to the Commission's attention. However, an effort has been made to indicate the Commission's preliminary views as to the seriousness of each weakness by categorizing its findings as requirements, recommendations, or suggestions.

A <u>requirement</u> results from an apparent failure of the program to meet a mandatory provision of the ABET Criteria for Accrediting Programs in Engineering Technology or applicable program criteria. A <u>recommendation</u> relates to a deficiency in complying fully with some provision of the criteria. The TAC's action will depend on the extent to which the program as a whole falls short of meeting overall standards for accreditation. <u>Suggestions</u> are offered for consideration by the institution to strengthen a program or correct weaknesses which do not constitute violations of the criteria.

DRAFT FOR REVIEW AND COMMENT

FERRIS STATE UNIVERSITY

Big Rapids, Michigan

INSTITUTIONAL FACTORS AFFFECTING

THE ENGINEERING TECHNOLOGY UNIT

Introduction

Ferris State University is a comprehensive public four-year college located in the community of Big Rapids, Michigan, a city of approximately 12,600 residents. It is the county seat for Mecosta County located approximately midway between the northern and southern ends of Michigan's Lower Peninsula. This former logging community is in the heart of an extensive recreation area of which Mecosta County, with its 101 lakes and four county parks, is a significant part. The university's career-oriented mission dates to its origin in 1884, when Woodbridge N. Ferris, later a two-term Michigan governor and U.S. Senator, established a private industrial school in Big Rapids. The original intent was to retrain out-of-work lumberjacks, and the mission is still to provide students with marketable skills for a changing society. Michigan has a booming economy with nine out of ten graduates finding jobs directly related to their major field of study.

Ferris State University provides a career-oriented education to more than 10,000 students each year and awards degrees at the associates, bachelor's, ~~and~~ masters AND PROFESSIONAL DOCTORATE levels. There are seven colleges: Allied Health Sciences, Arts and Sciences, Business, Education, Optometry, Pharmacy, and Technology.

Institutional Strengths

1. The campus is a large, modern and well planned facility with a technology unit that houses 30 technical programs serving 2500 students. The college is appreciative of its students and works to make the college experience a positive one. Students spoke well of the college and it's faculty. There is an automated telephone registration system connected to the campus computer system. With this system students are able to register for courses from home by using the touch tone keypad.

2. There is an outstanding faculty, administration, and staff to support the technology unit. The Mechanical Engineering Technology program is held in high regard as a lead program at the institution. The university expressed a very strong commitment to technology.

3. Industry representatives and graduates are very complimentary of the program. The industry advisory committee is active and effective. Industry has an excellent history of donating modern and expensive equipment for the use of the technology unit.

4. The university has an excellent reputation in the community, and a strong market demand for technology graduates exists. Placement of graduates is a high priority at the institution. Surveys to determine graduate and employer satisfaction with the program are done periodically to assist in program improvement and curriculum design. Students are able to prepare quality resumes with the assistance of personnel from the Placement Services office. These resumes become part of a data base that is accessible by employers from a web page.

5. The computing facilities on campus are excellent. There are numerous laboratory areas along with faculty offices that are equipped with state of the art equipment. Students were found using the word processing software, CAD programs, and the Internet in excellent computing facilities.

6. The college library is an efficient facility with excellent evening and weekend hours. Library services are supported by an on line catalog, the ASTI guide, Eric, and other CD-ROM resources. Many periodicals are on microfiche including Ferris' selection as a site of resources for the US Patent Office.

Institutional Weaknesses

Note: These weaknesses are considered to be applicable to all of the programs evaluated, whether or not the weaknesses are specifically cited under each program evaluation.

1. There is not a satisfactory reviewing process for admitting students to the Mechanical Engineering Technology program. Students can begin the core curriculum without obtaining a minimum level of competency in mathematics. Students should not begin the program until they have completed the MAT 110 course. The program is rigorous and has a high attrition in the first year. Much of this is attributed to poor mathematics preparation before starting the program. Section V.G.3. of the ABET criteria requires that proper academic advising be provided to ensure that students are adequately prepared to meet the requirements of the program. It is required that the college establish guidelines in the area of mathematics for admission to the Mechanical Engineering Technology program.

2. While the library is an excellent facility dedicated to the service of students, the specific holdings related to the Mechanical Engineering Technology program (LC TJ section) are outdated and inadequate to support a modern curriculum. Books in the Electrical Engineering Technology section (LC TK)

represent an excellent example of current and appropriate materials. Section V.K.5. of the ABET criteria requires library holdings to include a sufficient number of books to support the program. It is required that a program be established to purchase a selection of modern books related to the Mechanical Engineering Technology program. The program faculty should be involved at a primary level in the selection of such texts.

Other Comments on Institutional Factors

1. A large percentage of Mechanical Engineering Technology students continue on to a baccalaureate degree program at Ferris State University and neglect to apply for the Mechanical Engineering Technology associates of applied science degree. More students should be encouraged to undergo this formality to both improve statistics on Mechanical Engineering Technology graduates and also afford graduates the security an associate degree provides in the event they do not complete the baccalaureate program of choice.

2. TAC of ABET asks that all institutions encourage faculty, adjunct faculty, and members of industry advisory committees to become program evaluators. There is a special need for evaluators form industry as well as minorities and women. Interested persons should contact their technical society or ABET headquarters for more information.

PROGRAM EVALUATION

MECHANICAL ENGINEERING TECHNOLOGY

Associate Degree - Day Program

Introduction

The Mechanical Engineering Technology program has been in place since 1971 and is located in a 170,000 square foot facility called the ~~Applied Technology Center~~ Swan Technical Building. This center houses twelve degree options in a variety of fields including Electrical/Electronic Engineering Technology, Manufacturing Engineering Technology, and Plastics Engineering Technology. All programs are intended to serve the training needs of business and industry in western Michigan. This is an initial accreditation evaluation for the Mechanical Engineering Technology program.

This program was evaluated using the ABET *Criteria for Accrediting Programs in Engineering Technology* and the "Program Criteria for Mechanical Engineering Technology and Similarly Named Programs" dated November 4, 1995. The curriculum meets the minimum quantitative requirements for credit distribution in the subject areas prescribed by section V.A.1. of the ABET criteria. Strengths and weaknesses in meeting other provisions of the criteria are described below.

Program Strengths

1. The program is supported by exceptional computing facilities and equipment available to it. Most computer labs have Pentium class equipment with 17" monitors. All Personal Computer's have

both Windows and DOS environments, along with word-processing, spreadsheet, CAD, and communication software.

2. The ability to communicate ideas is essential for graduates of engineering technology programs. Students in the Mechanical Engineering Technology program were taped during oral communications demonstrating good use of oral reporting skills. Technical writing and the use of computers to create reports is an additional asset for graduates of technical programs. In this program, the ~~MACH~~ MECH-221 course requires both oral communications and the use of computers to provide an integrated learning experience for students.

3. The students have a high regard for the program and Ferris State University as a whole. There is a great deal of respect for this well qualified and dedicated faculty. Students were anxious to share classroom experiences with the visiting team and were helpful in demonstrating available software on computers.

4. The laboratory facilities supporting the program are modern and well equipped. Equipment dollars are tight, but donations by local industries have significantly helped in maintaining program quality. There are a wide variety of laboratory experiments in use by students with this equipment.

Program Weaknesses

Note: The weaknesses cited under Institutional Factors are applicable to this program area as well.

1. Four of twelve courses use textbooks from 8 to 23 years old. (MATL 240 - 8 years old, MECH 212 - 23 years old, MECH 222 - 13 years old, EEET 215 - 11 years old). Section V.D. of the ABET criteria specifies that "technical currency is important and must be assured." The technical skills of students must be current and appropriate to the education of students in modern techniques of applied design. It is required that more recent titles be adopted to replace older texts.

2. The strength of a program depends heavily on the ongoing professional development activities of its faculty. Some Mechanical Engineering Technology faculty are not participating in professional development activities. Section V.F.9. of the ABET criteria requires that faculty remain current through the active participation in professional societies, continuing education, consulting, etc. It is recommended that a higher percentage of faculty participate in professional development activities.

3. The display of student work in one course was insufficient for team members to evaluate the effectiveness of this course (MECH 223). Section III.B.1.c.9. of the ABET criteria requires that sufficient examples of student work in technical courses be made available to team members. It is recommended that additional examples of student work be made available for the next evaluation visit.

4. While there is outstanding computing equipment available at the university, it was not evident that it was being used in a majority of the programs technical design courses. Section V.C.6. of the

ABET criteria and section VI.N.2.b.4 of the ABET program criteria stresses the importance of the applications of computers in technical course work. It is recommended that more technical course work include applications of computers.

Other Comments on the Program

1. The kinematics course can be improved with the use of computer software such as Mechanimator, Interactive Physics, or Working Model Software. Students appreciate the opportunity to apply computing skills in this type of course.

2. The electrical course should include more work in programmable logic controller programming. The university has excellent donated equipment that makes this very possible.

APPENDIX B

ADMISSION CRITERIA - COLLEGE OF TECHNOLOGY

FERRIS STATE UNIVERSITY

TO: George R. Olsson, Program Coordinator

FROM: Vordyn Nelson, Educational Counselor

DATE: March 13, 1997

SUBJECT: Admissions Criteria - College of Technology

In response to your queries and in support of our answer to the concerns expressed in the TAC of ABET preliminary report, here are copies of the College of Technology admission criteria sheets for 1996-97 and 1997-98. They show that the admission criteria for the Mechanical Engineering Technology program has been and continues to be:

- 19 ACT score or better in mathematics with MATH 116 placement
- 2.0 High School Grade Point Average

These entry criteria have been in place for a number of years. Students that do not qualify for MATH 116 placement are admitted with pre-technical status (PMET designation for your mechanical students). They do not start the regular program technical sequence until they have mastered the prerequisites for MATH 116.

These criteria, entry quotas and entry points are reviewed annually by program faculty, coordinators, and department heads.

Attachments
1996-97 Admissions Criteria - College of Technology
1997-98 Admissions Criteria - College of Technology

cc: Dr. Mark A. Curtis, Interim Dean of Technology

COLLEGE OF TECHNOLOGY
1009 Campus Drive, Johnson 200, Big Rapids, MI 49307-2280
Phone 616 592-2890

96-97 CRITERIA
For 2+2 options we encourage applications (internal or external) to be submitted by Jan. 15.

TRANSFER APPLICANTS SHOULD BE REFERRED TO THE COLLEGE OF TECHNOLOGY

BS DEGREE PROGRAMS	Ent. Pte.	Qta.	G.P.A. HS	G.P.A. Col	
Auto & Heavy Equip. Mgt.	FW	50/25		2.0	AAS in AS, AB, AM, HES; Math 110 competency required.
Construction Mgt. (2+2)	FW	N/A		2.0	AAS in AT, BCT, or CET; Math 116/120 competency required.
* Const. Mgt.	FW	60/30	2.0	2.0	19 ACT Math; Math 116 placement. Refer all transfer students without AAS to College of Technology.
Elect/Elec. Eng. Tech.	F	36		2.0	AAS in Electronics; Math 126/130 competency required.
Facilities Management	F	20		2.0	AAS in AT, with 2.0 in major; Math 115/116 competency required.
Heavy Equipment Service Engineering Technology	F	15		2.0	AAS in HET; Math 115/116 competency required.
HVACR Eng. Tech.	F	15		2.5	AAS in HVAC. Math 115/116 competency required.
Manuf. Eng. Tech.	F	30		2.5	AAS in MET, MTT, PLT, TD, WEL with 2.75 in major; Math 126/130 placement required.
Plastics Eng. Tech.	F	30		2.5	AAS in Plastics with 2.7 in major and 2.5 in math. Math 126/130 competency required.
Printing Management	FW	20/20		2.0	AAS in Printing; Math 110 competency required.
Product Design Eng. Tech.	F	30		2.5	AAS in MET or TD/TD with 2.75 in major; Math 126/130 placement required.
** Surveying Engineering (Can be accepted any semester but must be referred to College of Technology)	F	30	2.0	2.0	24 ACT math; Math 120 placement. For Jr. level entry: Math 230 placement; must have completed a year of engineering physics (Phys 241 and 242) and a field surveying course.
Welding Eng. Tech.	F	20		2.5	AAS in Welding with 2.75 in major; Math 126/130 placement required.

NOTE: Transfer applicants (internal and external) with less than a 2.0 gpa who meet mathematics requirements should be referred to the Dean's Office for review.

ASSOC. DEGREE PROGRAMS	Ent. Pte.	Qta.	G.P.A. HS	G.P.A. Col	
Architectural Tech.	F	84	2.0	2.0	19 ACT math; Math 116 placement.
Automotive Body	F	32	2.0	2.0	
Automotive Service	FW	80/20	2.0	2.0	15 ACT math; Math 110 placement.
* Building Construction	FW	60/30	2.0	2.0	19 ACT math; Math 116 placement.
* Civil Eng. Tech.	FW	60/30	2.0	2.0	19 ACT math; Math 116 placement.
Electronics (Industrial)	F	84	2.0	2.0	19 ACT math; Math 116 placement.
Heavy Equip. Tech.	FW	45/45	2.0	2.0	
HVACR Technology	FW	25/20	2.0	2.0	19 ACT math, Math 115/116 placement
Manufacturing Tooling	F	30	2.0	2.0	15 ACT math; Math 110 placement (Math 116 preferred).
Mechanical Eng. Tech.	F	50	2.0	2.0	19 ACT math; Math 116 placement.
Plastics Technology	F	60	2.0	2.0	19 ACT math; Math 116 placement; High School Chemistry
Printing	FW	75/35	2.0	2.0	
** Surveying Technology	F	30	2.0	2.0	19 ACT math; Math 116 placement.
Tech Drafting/Tool Design	F	50	2.0	2.0	15 ACT math; Math 110 placement (Math 116 preferred).
Welding Technology	F	40	2.0	2.0	

* = combined quotas for CM, BCT & CET
** = combined quotas for SE & ST

-- OVER -- 8/10/95

TECHNOLOGY

96-97 CRITERIA
For 2+2 options we encourage applications (internal or external) to be submitted by Jan. 15.

TRANSFER APPLICANTS SHOULD BE REFERRED TO THE COLLEGE OF TECHNOLOGY

BS DEGREE PROGRAMS	Ent. Pte.	Qta.	G.P.A. HS	G.P.A. Col		Contact Person	Number
Auto & Heavy Equip. Mgt.	FW	50/25		2.0	AAS in AS, AB, AM, HES; Math 110 competency required.	Jack Richards, Program Dir.	(616) 592-2655
Construction Mgt. (2+2)	FW	N/A		2.0	AAS in AT, BCT, or CET; Math 116/120 competency required.	Bob Eastley, Faculty Coord.	(616) 592-2360
* Const. Mgt.	FW	60/30	2.0	2.0	19 ACT Math; Math 116 placement. Refer all transfer students without AAS to College of Technology.	Bob Eastley, Faculty Coord.	(616) 592-2360
Elect/Elec. Eng. Tech.	F	36		2.0	AAS in Electronics; Math 126/130 competency required.	Phil Marcotte, Dept. Head	(616) 592-2388
Facilities Management	F	20		2.0	AAS in AT, with 2.0 in major; Math 115/116 competency required.	Diane Nagelkirk, Faculty Coor.	(616) 592-2360
Heavy Equipment Service Engineering Technology	F	20		2.0	AAS in HET; Math 115/116 competency required.	Herb Nicholson, Program Dir.	(616) 592-2811
HVACR Eng. Tech.	F	15		2.5	AAS in HVAC. Math 115/116 competency required.	Dick Shaw, Program Dir.	(616) 592-2608
Manuf. Eng. Tech.	F	30		2.5	AAS in MET, MTT, PLT, TD, WEL with 2.75 in major; Math 126/130 placement required.	Dave Murray, Faculty Coord.	(616) 592-5979
Plastics Eng. Tech.	F	30		2.5	AAS in Plastics with 2.7 in major and 2.5 in math. Math 126/130 competency required.	Eugene Whitmore, Program Dir.	(616) 592-2650
Printing Management	FW	20/20		2.0	AAS in Printing; Math 110 competency required.	Pat Klarecki, Faculty Coord.	(616) 592-2845
Product Design Eng. Tech.	F	30		2.5	AAS in MET or TD /TD with 2.75 in major; Math 126/130 placement required.	Ken Kuk, Faculty Coord.	(616) 592-2511
** Surveying Engineering (Can be accepted any semester but must be referred to College of Technology)	F	30	2.0	2.0	24 ACT math; Math 120 placement. For Jr. level entry: Math 230 placement; must have completed a year of engineering physics (Phys 241 and 242) and a field surveying course.	Sayed Hashimi, Program Dir.	(616) 592-2632
Welding Eng. Tech.	F	20		2.5	AAS in Welding with 2.75 in major; Math 126/130 placement required.	Dave Murray, Faculty Coord.	(616) 592-5979

NOTE: Transfer applicants (internal and external) with less than a 2.0 gpa who meet mathematics requirements should be referred to the Dean's Office for review.

ASSOC. DEGREE PROGRAMS	Ent. Pte.	Qta.	G.P.A. HS	G.P.A. Col		Contact Person	Number
Architectural Tech.	F	84	2.0	2.0	19 ACT math; Math 116 placement.	Diane Nagelkirk, Faculty Coor.	(616) 592-2360
Automotive Body	F	32	2.0	2.0		Jack Richards, Program Dir.	(616) 592-2655
Automotive Service	FW	80/20	2.0	2.0	15 ACT math; Math 110 placement.	Jack Richards, Program Dir.	(616) 592-2655
* Building Construction	FW	60/30	2.0	2.0	19 ACT math; Math 116 placement.	Bob Eastley, Faculty Coord.	(616) 592-2360
* Civil Eng. Tech.	FW	60/30	2.0	2.0	19 ACT math; Math 116 placement.	Bob Eastley, Faculty Coord.	(616) 592-2360
Electronics (Industrial)	F	84	2.0	2.0	19 ACT math; Math 116 placement.	Phil Marcotte, Dept. Head	(616) 592-2388
Heavy Equip. Tech.	FW	45/45	2.0	2.0		Herb Nicholson, Program. Dir.	(616) 592-2811
HVACR Technology	FW	25/20	2.0	2.0	19 ACT math, Math 115/116 placement	Dick Shaw, Program Dir..	(616) 592-2608
Manufacturing Tooling	F	30	2.0	2.0	15 ACT math; Math 110 placement (Math 116 preferred).	Dave Murray, Faculty Coord.	(616) 592-5979
Mechanical Eng. Tech.	F	50	2.0	2.0	19 ACT math; Math 116 placement.	Ken Kuk, Faculty Coord.	(616) 592-2511
Plastics Technology	F	60	2.0	2.0	19 ACT math; Math 116 placement; High School Chemistry (or CHEM 103 equivalent)	Eugene Whitmore, Program Dir.	(616) 592-2650
Printing	FW	75/35	2.0	2.0		Pat Klarecki, Faculty Coord.	(616) 592-2845
** Surveying Technology	F	30	2.0	2.0	19 ACT math; Math 116 placement.	Sayed Hashimi, Program Dir.	(616) 592-2632
Tech Drafting/Tool Design	F	50	2.0	2.0	15 ACT math; Math 110 placement (Math 116 preferred).	Ken Kuk, Faculty Coord.	(616) 592-2511
Welding Technology	F	40	2.0	2.0		Dave Murray, Faculty Coord.	(616) 592-5979

* -- combined quotas for CM, BCT & CET

** -- combined quotas for SE & ST

OVER

8/10/95

1997-98 ADMISSION CRITERIA - COLLEGE OF TECHNOLOGY
ALL TRANSFER APPLICANTS SHOULD BE REFERRED TO THE COLLEGE
For 2+2 options we encourage applications (internal or external) to be submitted by Jan.15

BS DEGREE PROGRAMS	Ent. Pte.	Qta.	G.P.A. HS	G.P.A. Col		Program Coordinator	Phone
Auto & Heavy Equip. Mgt.	FW	50/25		2.0	AAS in AS, AB, HET; Math 110 competency required.	Mike Ropele	(616) 592-2361
Comp. Networks & Sys. (2+2)	F	18		2.0	AAS in electronics; Math 126/130 competency required.	Phil Marcotte	(616) 592-2388
3)Comp. Networks & Sys. (0+4)	F	84		2.0	19 ACT math; Math 116 placement.	Phil Marcotte	(616) 592-2388
Construction Mgt. (2+2)	FW	N/A		2.0	AAS in AT, BCT, CET; Math 126/130 competency required.	Bob Eastley	(616) 592-2369
1)Const. Mgt. (0+4)	FW	60/30	2.0	2.0	19 ACT Math; Math 116 placement.	Bob Eastley	(616) 592-2369
Elect/Elec. Engr. Tech.	F	36		2.0	AAS in Electronics; Math 126/130 competency required.	Phil Marcotte	(616) 592-2388
Facilities Management	F	20		2.0	AAS in AT, with 2.0 in major; Math 115/116 competency required.	Mel Kantor	(616) 592-2625
Hvy Eqp Ser Engr. Tech.	F	20		2.0	AAS in HET; Math 115/116 competency required.	Keith Cripe	(616) 592-2810
HVACR Engr. Tech.	F	20		2.5	AAS in HVAC with a 2.5 HPA; Math 115/116 competency required.	Dick Shaw	(616) 592-2608
Manufacturing Engr. Tech	F	30		2.5	AAS in MET, MTT, PLT, TD, WEL with 2.5 HPA; 2.75 in major; Math 126/130 placement required.	Gary Ovans	(616) 592-2511
Plastics Engr. Tech.	F	30		2.5	AAS in Plastics with 2.5 HPA; 2.7 in major and 2.5 in math; Math 126/130 competency required.	Gene Whitmore	(616) 592-2640
Printing Management	FW	20/20		2.0	AAS in Printing; Math 110 competency required.	Pat Klarecki	(616) 592-2845
Product Design Engr. Tech.	F	30		2.5	AAS in MET or TDTD with 2.5 HPA; 2.75 in major; Math 126/130 placement.	George Olsson	(616) 592-2511
Quality Engr. Tech.	F	30		2.5	AAS in MET, MTT, PLT, TD, WEL with 2.5 HPA; 2.75 in major; Math 126/130 placement required. (offered at ATC- Grand Rapids only).	Gary Ovans	(616) 592-2511
2)Surveying Engineering	F	30	2.0	2.0	24 ACT math; Math 120 placement. For Jr. level entry; Math 230 placement; must have completed a year of engineering physics (Phys 241, 242) and a field surveying course.	Sayed Hashimi	(616) 592-2632
Welding Engr. Tech.	F	20		2.5	AAS in Welding with 2.5 HPA; 2.75 in major; Math 126 placement required.	Ken Kuk	(616) 592-2511

NOTE: New students must have a minimum 2.0 GPA in High School studies. Transfer applicants (internal and external) with less than a 2.0 GPA who meet mathematics requirements should be referred to the Dean's Office for review.

AAS DEGREE PROGRAMS	Ent. Pte.	Qta.	G.P.A. HS	G.P.A. Col		Program Coordinator	Phone
Architectural Tech.	F	72	2.0	2.0	19 ACT math; Math 116 placement.	Mel Kantor	(616) 592-2625
Automotive Body	F	32	2.0	2.0		Greg Key	(616) 592-2655
Automotive Service	FW	80/20	2.0	2.0	15 ACT math; Math 110 placement.	Greg Key	(616) 592-2655
1)Building Const. Tech.	FW	60/30	2.0	2.0	19 ACT math; Math 116 placement.	Bob Eastley	(616) 592-2369
1)Civil Engr. Tech.	FW	60/30	2.0	2.0	19 ACT math; Math 116 placement.	Bob Eastley	(616) 592-2369
3)Electronics (Industrial)	F	84	2.0	2.0	19 ACT math; Math 116 placement.	Phil Marcotte	(616) 592-2388
Heavy Equip. Tech.	FW	45/45	2.0	2.0	15 ACT math; Math 110 placement.	Keith Cripe	(616) 592-2810
HVACR Technology	FW	25/20	2.0	2.0	19 ACT math; Math 115 or 116 placement.	Dick Shaw	(616) 592-2608
Manufacturing Tooling	F	35	2.0	2.0	15 ACT math; Math 110 placement (19 ACT/Math 116 preferred).	Ken Kuk	(616) 592-2511
Mechanical Engr. Tech.	F	50	2.0	2.0	19 ACT math; Math 116 placement.	George Olsson	(616) 592-2511
Plastics Technology	FW	60	2.0	2.0	19 ACT math; Math 116 placement; High School Chemistry/CHM 103 equiv.	Gene Whitmore	(616) 592-2640
Printing	FW	75/35	2.0	2.0		Pat Klarecki	(616) 592-2845
2)Surveying Technology	F	30	2.0	2.0	19 ACT math; Math 116 placement.	Sayed Hashimi	(616) 592-2632
Tech Drafting/Tool Design	F	50	2.0	2.0	15 ACT math; Math 110 placement (19 ACT/Math 116 preferred).	George Olsson	(616) 592-2511
Welding Technology	F	40	2.0	2.0		Ken Kuk	(616) 592-2511

1)2)3): Combined Quotas

COLLEGE OF TECHNOLOGY
PROGRAM REFERRAL GUIDE/DIRECTORY
1996-97

PROGRAM NAME	CONTACT	PHONE	OFFICE
Bachelor Degree Programs			
Auto & Heavy Equip Mgt.	Mike Ropele	2361	A-C 101
Computer Networks & Systems	Phil Marcotte	2388	SWN 405
Construction Management	Bob Eastley	2369	JHN 410
Elect/Elec Engr Tech	Phil Marcotte	2388	SWN 405
Facilities Management	Mel Kantor	2625	JHN 206
Hvy. Equip. Service Engr. Tech.	Keith Cripe	2810	HEC 203
HVACR Eng. Tech.	Dick Shaw	2608	CTC 102
Manufacturing Engr. Tech.	Gary Ovans	2511	SWN 109
Plastics Engr. Tech.	Gene Whitmore	2640	PLT 104
Printing Management	Pat Klarecki	2845	SWN 314
Product Design Engr. Tech.	George Olsson	2511	SWN 109
Quality Engineering Technology	Gary Ovans	2511	SWN 109
Surveying Engineering	Sayed Hashimi	2632	JHN 414
Welding Engr. Tech.	Ken Kuk	2511	SWN 109
Associate Degree Programs			
Architectural Technology	Mel Kantor	2625	JHN 206
Automotive Body	Greg Key	2655	A-C 101
Automotive Service	Greg Key	2655	A-C 101
Building Construction Technology	Bob Eastley	2369	JHN 410
Civil Engineering Technology	Bob Eastley	2369	JHN 410
Industrial Electronics Tech.	Phil Marcotte	2388	SWN 405
Heavy Equipment Technology	Keith Cripe	2810	HEC 203
HVACR Technology	Dick Shaw	2608	CTC 102
Manufacturing Tooling Tech.	Ken Kuk	2511	SWN 109
Mechanical Engr. Tech.	George Olsson	2511	SWN 109
Plastics Technology	Gene Whitmore	2640	PLT 104
Printing Technology	Pat Klarecki	2845	SWN 314
Surveying Technology	Sayed Hashimi	2632	JHN 414
Technical Drafting/Tool Design	George Olsson	2511	SWN 109
Welding Technology	Ken Kuk	2511	SWN 109
Student Academic Affairs	**Dean's Office**	**2890**	**JHN 200**

FERRIS STATE UNIVERSITY

COPY

October 10, 1995

Student #: **-6013**

College: **Technology**

Academic Program: **Mechanical Engineering Technology**
Fall Semester 1996

Dear Jeffrey:

Congratulations on your admission to Ferris State University. We are delighted to have you join our student body and look forward to assisting you in reaching the educational and personal goals you have set for yourself.

TO RETAIN THIS RESERVATION PLEASE COMPLY WITH THE FOLLOWING:

1. Submit a $75 enrollment deposit payable to Ferris State University no later than **November 1, 1995**.

2. IF YOU HAVE TAKEN the ACT, please request a profile of your scores be sent to Ferris State University by contacting: ACT Records, P.O. Box 451, Iowa City, IA 52243-0451.

   The Ferris ACT College Code Number is 1994.

   IF YOU HAVE NOT TAKEN the ACT, please contact your guidance counselor for assistance and register for the next examination period.

3. Every student is required to reside in a campus residence hall unless permission is obtained from the Office of Residential Life to live elsewhere. You will receive a residence hall contract prior to the beginning of the term.

4. All new students are encouraged to attend an Orientation/Registration program. Students entering Fall semester will begin receiving instructions in April regarding summer Orientation/Registration sessions.

Again, congratulations on your admission, Jeffrey. We are happy you will be joining our student body.

Sincerely,

Tom Jenkins

Tom Jenkins
Admissions Counselor

Enclosure

REFUND POLICY: A refund of the $75 enrollment deposit will be made when notice of cancellation is received by the Admissions Office no later than August 1 for Fall semester enrollees or 30 days prior to the registration date for Winter or Summer semester enrollees.

Cancellation after the deadline date for any semester will result in forfeiture of the advanced enrollment deposit.

OFFICE OF ADMISSIONS
420 Oak Street, Prakken 101, Big Rapids, MI 49307-2020
Phone 616 592-2100 1 800 4-FERRIS (MI, IL, IN, OH, WI)
E-Mail ADMISSIONS@ACT01.FERRIS.EDU World Wide Web HTTP://WWW.FERRIS.EDU

Admissions Copy: (College of Technology, Freshman).

May 8, 1996

Student #: **2860**

College: **Technology**

Academic Program: **Pre-Mechanical Engineering Technology**
Fall Semester 1996

Mechanical Engineering Technology
Fall Semester 1997

Dear Dwayne:

Congratulations on your admission to Ferris State University. We are delighted to have you join our student body and look forward to assisting you in reaching the educational and personal goals you have set for yourself.

TO RETAIN THIS RESERVATION PLEASE COMPLY WITH THE FOLLOWING:

1. Every student is required to reside in a campus residence hall unless permission is obtained from the Office of Residential Life to live elsewhere. You will receive a residence hall contract prior to the beginning of the term.

2. All new students are encouraged to attend an Orientation/Registration program. Students entering Fall semester will begin receiving instructions in April regarding summer Orientation/Registration sessions.

Again, congratulations on your admission, Dwayne. We are happy you will be joining our student body.

Sincerely,

Tyrone Collins, LPC
Admissions Counselor

Enclosure

FERRIS STATE UNIVERSITY

TO: Pre-Technical Student

FROM: Vordyn D. Nelson
Associate Dean
Office of Student Academic Affairs
College of Technology

SUBJECT: Admission Status

Congratulations! The Admissions Office has **admitted you to the Pre-Technical phase** of the program you requested. The semester you may begin the technical sequence of your program can not be determined at this time since we have not yet received your ACT test scores. **However, as soon as we receive your ACT profile, your application will automatically be reevaluated and we will notify you of the earliest date you may enter the technical sequence of the program.**

If you are a transfer student, our records indicate you have not yet completed an appropriate pre-requisite collegiate math class **OR** ACT data does not meet the admission requirement. A summary of admission criteria is noted below:

Curriculum	**GPA**	**ACT Math Sub Test Score**
Architectural Technology	2.0	19
Automotive Service Technology	2.0	15
Building Construction Technology	2.0	19
Civil Engineering Technology	2.0	19
Computer Networks and Systems	2.0	19
Electronics - Industrial	2.0	19
HVACR Technology	2.0	19
Manufacturing Tooling Technology	2.0	15
Mechanical Engineering Technology	2.0	19
Plastics Technology **(Chemistry required)**	2.0	19
Surveying Technology	2.0	19
Technical Drafting & Tool Design	2.0	15

NOTE - If you have already taken the ACT, please request a copy of your profile to be sent to Ferris State University, **college code number 1994**, by contacting:

ACT
P.O. BOX 451
Iowa City, IA 52243-0451

If you have not registered for ACT, please contact your guidance counselor for assistance and register for the next examination period.

As a **Pre-Technical student** you will be advised to enroll in general education courses that will strengthen your academic background and fulfill prerequisites required in the program you wish to enter. Also, **please note**, enrollment as a Pre-Technical student will extend the number of semesters required for you to complete the associate degree; this is due to the sequence of technical courses required in your program.

Welcome to Ferris State! We look forward to serving your educational needs.

FERRIS STATE UNIVERSITY

TO: Mechanical Engineering Technology Faculty:
Chuck Drake, Assistant Professor
George Olsson, Professor and Program Coordinator

FROM: Mark A. Curtis, Interim Dean M.C.

SUBJECT: Implementing Mechanical Engineering Technology Program Admissions Criteria

DATE: March 24, 1997

It has been brought to my attention that, from time to time, applicants have been admitted to the Mechanical Engineering Technology (MET) program as regular students (MECH designation) who do not meet the College of Technology admissions criteria. These include an ACT math score of at least 19 for entrance into the MET program.

You are instructed to work with our Educational Counselor and with the Admissions Office to insure that future applicants meet the math requirements before they achieve regular MET student status. Applicants who require remedial math instruction may be given pre-technical status (PMEC designation).

MAC:rrh

C:\DEPARTMENTS\DESIGN-MPGE-GRAP\MECH ENGR\MECHADMCRITERIA.DOC

COLLEGE OF TECHNOLOGY
Johnson 200, 1009 Campus Dr., Big Rapids, MI 49307-2890
Phone 616 592-2890

APPENDIX C

ADMISSION DATA FOR STUDENTS ENTERING MET PROGRAM

Page

MECHANICAL ENGINEERING TECHNOLOGY PROGRAM - ADMISSIONS FALL 1996

	ID No.	Math ACT	HS GPA	Math Placement	Admission Status	Continued in MET Program	Remarks
1	8991	30	3.39	116	MECH	no	(1)
2	6410	24	3.21	116	MECH	no	
3	1662	19	2.95	116	MECH	yes	
4	5667	29	3.37	116	MECH	yes	
5	1814	19	2.46	116	MECH	no	
6	9135	19	3.17	116	MECH	no	
7	8314	23	2.22	116	MECH	yes	
8	9167	23	2.88	116	MECH	yes	
9	4364	26	2.73	116	MECH	yes	
10	3778	20	3.08	116	MECH	yes	
11	4225	26	3.65	116	MECH	no	
12	7688	26	3.77	116	MECH	yes	
13	1110	22	3.14	116	MECH	yes	
14	4309	22	3.04	116	MECH	yes	
15	6142	24	2.20	116	MECH	no	
16	5035	25	3.29	116	MECH	yes	
17	8176	21	2.79	116	MECH	yes	
18	7484	18	2.34	116	MECH	yes	(4)
19	1577	16	1.80	110	MECH	no	(4)
20	0392	17	2.70	110	Transfer	yes	(2), (4)
21	5115			116	Transfer	no	
22	9320			120	Transfer	yes	
23	8006	18	2.14	110	Transfer	no	(4)
24	1074	20		116	Transfer	yes	
25	2860	15	2.54	110	PMEC	no	(3)
26	4644	15	2.13	100	PMEC	no	
27	9381	16	2.42		PMEC	no	
28	8557	16	2.50		PMEC	no	
29	0999	17	2.24		PMEC	no	
30	7515	14	2.02	116	PMEC	no	(5)
31	6279	13	2.51	110	PMEC	no	
32	6533	16	2.01	010	PMEC	no	
33	6047	17	2.84	110	PMEC	no	

NOTES

(1) MECH denotes regular admission to the MET program.

(2) Transfer students are evaluated for admission based on their college records.

(3) PMEC denotes pre-technical admission to the MET program. Such students are to complete remedial math before entering the MET technical course sequence.

(4) Four students who did not meet the math entry criteria were granted regular admission status.

(5) One PMEC student was improperly placed into MATH 116.

MECHANICAL ENGINEERING TECHNOLOGY PROGRAM - ADMISSIONS FALL 1995

	ID No.	Math ACT	HS GPA	Math Placement	Admission Status	Continued in MET Program	Remarks
1	3099	29	3.02	216	MECH	yes	(1)
2	5894		2.80	126	MECH	yes	
3	1021	20	3.06	116	MECH	no	
4	8775	19	2.76	116	MECH	yes	
5	5210	19	2.83	116	MECH	no	
6	1460	24	3.75	130	MECH	yes	
7	5623	20	2.72	116	MECH	yes	
8	3591	23	3.96	116	MECH	yes	
9	8549	20	3.00		MECH	yes	
10	8298	24	2.80	116	MECH	yes	
11	7403	19	3.13	116	MECH	yes	
12	1176	23	2.25	116	MECH	yes	
13	6033	21	3.02	116	MECH	yes	
14	4339	28	3.78	130	MECH	yes	
15	1929	23	3.92		MECH	yes	
16	2968	18	2.78	110	MECH	yes	(4)
17	9313	18	2.60	116	MECH	yes	(4)
18	7165	18	2.89	116	MECH	yes	(4)
19	2392		3.23	116	Transfer	yes	(2)
20	2563	21	1.90	116	Transfer	yes	
21	3370	25	3.11	120	Transfer	yes	
22	3630	18		116	Transfer	no	
23	5711	25	2.53	116	Transfer	no	
24	7979		2.67	116	Transfer	yes	
25	7513			116	Transfer	yes	
26	8303	21		116	Transfer	yes	
27	2943	22	2.15		Transfer	no	
28	9420	30	3.49		Transfer	no	
29	9247	24	2.61	126	Transfer	no	
30	3281	23	3.04	115	Transfer	no	
31	2520	18	3.05	110	PMEC	no	(3)
32	6464	15	1.45	110	PMEC	no	
33	4283	16	2.59	110	PMEC	no	
34	7284	18	2.13	116	PMEC	no	(5)

NOTES

(1) MECH denotes regular admission to the MET program.

(2) Transfer students are evaluated for admission based on their college records.

(3) PMEC denotes pre-technical admission to the MET program. Such students are to complete remedial math before entering the MET technical course sequence.

(4) Three students who did not meet the math entry criteria were granted regular admission status.

(5) One PMEC student was improperly placed into MATH 116.

MECHANICAL ENGINEERING TECHNOLOGY PROGRAM - ADMISSIONS FALL 1994

	ID No.	Math ACT	HS GPA	Math Placement	Admission Status	Continued in MET Program	Remarks
1	2222	23	2.56	116	MECH	yes	(1)
2	6632	19	2.62	116	MECH	no	
3	2939	22		116	MECH	yes	
4	9170	24	3.68		MECH	yes	
5	6929	20	2.20	116	MECH	yes	
6	7911	23	2.70	116	MECH	yes	
7	0911	23	2.77	116	MECH	yes	
8	6212	20	3.92	116	MECH	yes	
9	4552		2.11	116	MECH	no	
10	9515	24	3.16	126	MECH	yes	
11	4653	19	3.23	116	MECH	yes	
12	9446	20	2.58	116	MECH	yes	
13	9436	19	3.19	116	MECH	yes	
14	3930	23	2.68	116	MECH	yes	
15	9650	22	3.53	116	MECH	yes	
16	5209	19	3.41	116	MECH	no	
17	4555	21	2.12	116	MECH	no	
18	8765	20	2.20	116	MECH	no	
19	3533	18	2.17	110	MECH	no	(4)
20	4273	16	2.49	110	MECH	no	(4)
21	6418	18	2.47	110	MECH	no	(4)
22	4645	16	1.81	116	Transfer	no	(2)
23	7733	23	2.09	116	Transfer	no	
24	9626	23		116	Transfer	yes	
25	7218	16		116	Transfer	no	
26	4041	27		116	Transfer	yes	
27	2919	16	2.52	110	PMEC	no	(3)
28	2041	13	2.17	010	PMEC	no	
29	7476	14			PMEC	no	

NOTES

(1) MECH denotes regular admission to the MET program.

(2) Transfer students are evaluated for admission based on their college records.

(3) PMEC denotes pre-technical admission to the MET program. Such students are to complete remedial math before entering the MET technical course sequence.

(4) Three students who did not meet the math entry criteria were granted regular admission status.

APPENDIX D

REGISTRATION PROCESS COMMITTEE AND UNIVERSITY COLLEGE

Mechanical Engineering Technology

Response to Accreditation Visitation Report 1996-1997

Section 2 of 3

REGISTRATION PROCESS COMMITTEE
Mission Statement
October 19, 1996

The Registration Process Committee will identify strategies for providing a seamless integration of services to enhance the registration process. It will focus on learning the needs of the various constituents of this process - students, parents, employees and their respective departments, taxpayers, governments, business and industry - then strive to meet and exceed associated expectations. It will utilize resource information gathered by various campus committees in addition to constituents involved in the process.

The committee will develop and recommend complementary institutional procedures and practices congruent with students' educational needs; reducing complexity, promoting cross-functional cooperation, and enhancing the university's service to its constituents.

Efforts to enhance the registration system demand long-term institutional effort based on continuous evaluation of all aspects of the process. The committee will encourage the empowerment of employees to solve problems, the training of employees to maintain on-going improvement of the process, and continual communication with constituents to make them aware of the rationale for policies, programs and practices.

REGISTRATION PROCESS COMMITTEE
SCOPE
February 21, 1997

The Registration Process Committee will define the registration process as beginning when the prospective student is first admitted to Ferris State University and continues through each registration period until the student graduates.

Committee Members:

Dennis Batt
Sonya Bigelow
Matt Chaney
Roxanne Cullen
Dave Engels
Charles Flood
Jana Hurley
Bill Kerwin
Jerena Keys
Matt Klein
Becky Kowalkoski
Dave Lerew
Don Mullens
Paul Peoples
Linda Travis
Cheryl Webber

Sub-committees:

I. Student and Other Stakeholders: Dennis Batt, Charles Flood, Jerena Keys, Becky Kowalkoski

II. Current Process: Sonya Bigelow, Roxanne Cullen, Jana Hurley, Bill Kerwin, Paul Peoples, Cheryl Webber

III. Best Practices: Matt Chaney, Dave Engels, Matt Klein, Don Mullens

IV. Communications: Roxanne Cullen

University College

University College is the newest college on the Ferris campus, starting its inaugural year fall semester of 1996. University College enjoys the role of providing a variety of academic and career selection services and opportunities to students enrolled in the other seven colleges. Among the services and opportunities housed under the University College umbrella are the Honors Program, Educational & Career Counseling, the Collegiate Skills and Directed Studies Programs, the Academic Support Center, the Special Needs Counselor, the Structured Learning Assistance workshops and Freshman Seminars, FSUS 100/101.

Students selected for the Honors Program remain members of their chosen academic major while enjoying enriching global, cultural, social, and community service opportunities. In its inaugural semester, fall of 1997, the Honors Program is a residential program offering international enrichment to the student's experiences.

Educational and career counseling is available to students with chosen majors through counselors located in the Dean's Offices of the Colleges of Allied Health Sciences, Arts & Science, Business, Education, and Technology. Students who are career undecided, as well as Collegiate Skills and Directed Studies students, are enrolled in University College and receive educational and career testing, planning, and counseling services through the Educational & Career Counseling Center.

The Collegiate Skills and Directed Studies programs offer developmental and intrusive programming and counseling for a limited number of student enrollees who performed below a 2.0 gpa during high school or in their freshman year of college, respectively. Based on ACT and placement tests, students in these programs are required to complete developmental courses that may include reading, study skills, math, English, and transition to college. Class attendance is mandatory and grades and performance are monitored by counselors and faculty advisers. Continued enrollment at Ferris and transfer to a degree-granting program is based on meeting attendance and academic requirements.

The Academic Support Center offers a variety of tutorial services to all students. These services are **free of any additional charge** and are available in lab, workshop, and one-on-one formats. Students should contact the Academic Support Center for services at the first sign of academic difficulty.

The Special Needs Counselor is housed in the Educational & Career Counseling Center and offers limited services for blind, visually impaired, physically disabled, and learning disabled students. Limited textbook taping and/or note taking is available as is information concerning handicap accessible residence halls and classrooms. Students needing special services should contact the Special Needs Counselor.

Structured Learning Assistance (SLA) classes offer students immediate, additional labs for identified "killer" courses, classes that cause many freshmen academic difficulty. SLA classes offer four additional hours weekly in which students may work on homework, ask questions, receive one-on-one assistance, and receive mini-lectures. SLA lab attendance is required whenever a student falls below a C in the course. Many students attend all the lab sessions because the labs offer discipline and structure for completing homework and they improve grade points in the class. Look for the SLA designation on many classes in math, science, allied health, and general education.

The Freshman Seminars (FSUS 100/101) are one credit and meet one hour weekly to orient the new student to the many services and opportunities available at Ferris. The instructor for these classes is often the student's academic advisor, serving as a mentor and resource if the student encounters problems and concerns during the freshman year. This seminar is required by a number of colleges and programs on campus.

APPENDIX E

LIBRARY ACQUISITION ACTIVITIES RELATING TO MET PROGRAM

Ferris State University
Library & Instructional Services

TO: Dr. Mark A. Curtis, Interim Dean of Technology

FROM: Geraldine L. Hurt, Interim Dean, Library & Instructional Services

SUBJ: Improvement in Library Holdings Relating to the Mechanical Engineering Technology Program

DATE: March 13, 1997

A review of the Timme Library holdings in the Mechanical Engineering Technology area (Library of Congress classification TA and TJ) confirmed the findings of the TAC of ABET visitation team that the collection was inadequate at the time of their visit.

To support your efforts to meet TAC of ABET requirements, we have provided a good effort through the following book acquisition activities:

1. In our Acquisitions program with the Yankee Book Peddler Approval Plan, currently, the 94 requests received from the MET faculty are being processed as priority items.

2. Additional book and journal acquisitions were made from other budget sources.

3. Gifts: We have recently received and are now cataloging 134 books relating to the MET area.

Also, to clarify our holdings, we have provided the MET faculty with the following information:

- Bibliographic list of present holdings in the TA and TJ classifications relating to MET
- Bibliographic list of items in process via the Approval Plan
- List of recent gifts

Additionally, the Timme Library has, and continues to receive in microfiche form, thousands of government reports generated by NIST (and it's predecessor NBS), NASA and other agencies of interest to mechanical engineering. Secondly, we are an official repository of the U.S. Patent Office; our patent database exceeds 780,000 items. And thirdly, the Timme Library is testing the FirstSearch Database which will provide access to a broad base of journals, many in full-text form, which will include some added current materials that fall into this category. We will receive free access to FirstSearch from the Library of Michigan for one year and will review for purchase at the end of this time, given adequate funding.

cc: MET Program Faculty
Charles Drake
George Olsson
Ray Dickinson, COT Library Liaison

Abigail S. Timme Library • 1201 S. State Street • Big Rapids, Michigan 49307-2747 • (616) 592-3602

To : George Olsson
From : Ray Dickinson, COT Library Liaison
Subject : Acquisition of library materials for the MET program from Yankee Book Peddelers
Date : March 11, 1997

Attached to this memo is a list of all those materials that Mr. Charles Drake requested be placed on order for the MET program. The list consists of 94 titles, comprising more than $7,000.00 worth of materials. While some of the books have already been ordered, many have not, due to lack of current funds. Those requests that don't get filled during this academic year will be ordered in the next academic year.

This, of course, is only for the current order. I expect that as other materials become available in your program, they too will be ordered.

The Timme Library and its staff are committed to improving the quality of the MET collection to the very best of its ability.

QA935 Kelly, S. Graham
Schaum's outline of theory and problems of mechanical vibrations.
McGraw-Hill, 1996.
0070340412

TA165 Wright, Charles P.
Applied measurement engineering: how to design effective mechanical measurement systems. Prentice-Hall, 1995.
0132534770

TA174 Eggleston, John
Teaching design and technology education. 2nd Ed. Open University,
1994.
0335195776

TA174 Karaiskos, Peter
Autocad for mechanical engineers and designers. John Wiley, 1995.
0471017795

TA174 Salomone, Thomas A.
What every engineer should know about concurrent engineering. Marcel Dekker, 1995.
0824795784

TA345 Robertson, John S.
Engineering mathematics with Mathematica. McGraw-Hill, 1995.
0070531714

TA347 Bathe, Klaus-Jurgen
Finite element procedures. Rev. Ed. Prentice-Hall, 1996.
0133014584

TA347 Cook, Robert D.
Finite element modeling for stress analysis. John Wiley, 1995.
0471107743

TA350 Hannah, J.
Applied mechanics. 3rd Ed. Longman, 1995.
0582256321

TA355 Fertis, Demeter G.
Mechanical and structural vibrations. John Wiley, 1995.
0471106003

TA355 Fuller, C. R.
Active control of vibration. Academic, 1996.
0122694406

TA357 Douglas, J. F.
Fluid mechanics. 3rd. Ed. John Wiley, 1995.
0470234415

TA357 Douglas, J. F.
Solving problems in fluid mechanics, v. 1. 3rd Ed. Longman, 1996.
0582239877

TA357 *Handbook of computational fluid mechanics.* Academic Press, 1996.
0125530102

TA357 *Handbook of fluid dynamics and fluid machinery.* John Wiley, 1996.
0471873527

TA357 Young, Donald F.
Brief introduction to fluid mechanics. Rev. Ed. John Wiley, 1997.
0471137715

TA357.5 Brennen, Christopher E.
Cavitation and bubble dynamics. Oxford Univ. Press, 1995.
0195094093

TA357.5 *Fluid mechanics measurements. 2nd Ed.* Taylor & Francis, 1996.
156032306X

TA357.5 Miller, R. W.
Flow measurement engineering handbook. 3rd Ed. McGraw-Hill, 1996.
0070423660

TA405 Rovlance, David
Mechanics of materials. John Wiley, 1996.
0471593990

TA405 Spiegel, Leonard
Applied strength of materials. Merrill/Macmillan, 1994.
0024149705

TA417.6 *Handbook of measurement of residual stresses.* Prentice Hall, 1996.
013255738X

TA418	*Thermal stresses, v. IV.* North Holland, 1996. 0444815716
TA492	Bickford, John H. *Introduction to the design and behavior of bolted joints. 3rd Ed.* Marcel Dekker, 1995. 0824792971
TA492	*Connecting in steel structures: III: behavior, strength and design.* Pergamon, 1996. 0080428215
TA642	Kaveh, A. *Structural mechanics: graphs and matrix methods. 2nd Ed.* John Wiley, 1995. 0471960284
TA645	Megson. T. H. G. *Structural and stress analysis.* Halsted 1996. 0470235632
TA654	Geradin, Michel *Mechanical vibrations: theory and application to structural dynamics.* John Wiley, 1994. 0471939277
TA690	Mazzolani, F. M. *Aluminum alloy structures. 2nd Ed.* E&FN Spon/Chapman-Hall, 1995. 0419177701
TA690	Sharp, Maurice L. *Fatigue design of aluminum components and structures.* McGraw-Hill, 1996. 0070569703
TJ145	Everett, Louis *Understanding engineering systems via conservation. 3rd Ed.* McGraw-Hill, 1994. 0070199396
TJ145	Langdon, Davis *Spon's mechanical and electrical services price book, 1995. 26th Ed.* E&FN Spon/Chapman-Hall, 1994. 041919360X

TJ145 Nakazawa, Hiromu
Principles of precision engineering. Oxford Univ. Press, 1994.
019856266T

TJ145 Shigley, Joseph E.
Theory of machines and mechanisms. McGraw-Hill, 1995.
0070569304

TJ151 *Marks' standard handbook for mechanical engineers. 10th Ed.*
McGraw-Hill, 1996.
0070049971

TJ151 Oberg, Erik
Machinery's handbook. 25th Ed. Industrial, 1996.
0831125756

TJ151 Timings, Roger
Newnes mechanical engineer's pocket book. Heinemann Newnes, 1995.
0750609192

TJ159 Lindeburg, Michael R.
101 solved mechanical engineering problems. Professional Publications, 1995.
0912045779

TJ163 *Mechatronics: the basis for new industrial development.* Computational Mechanics. 1994.
1562522914

TJ163 Walsh, Ronald A.
Electromechanical design handbook. 2nd. Ed. McGraw-Hill, 1995.
0070680353

TJ163.12 Auslander, David M.
Mechatronics: mechanical system interfacing. Prentice-Hall, 1996.
013120338X

TJ163.12 Bolton, W.
Mechatronics: electronic control systems in mechanical engineering.
Longman, 1995.
0582256348

TJ163.12 Kamm, Lawrence J.
Understanding electro-mechanical engineering: an introduction to mechatronics. IEEE Press Books, 1996.
0780310314

TJ163.2 Ohta, Tokio
Energy technology: sources, systems and frontier conversion. Pergamon, 1994.
0080421326

TJ163.2 Thumann, Albert
Handbook of energy engineering. 3rd Ed. Fairmont, 1995.
0132276879

TJ163.3 *CRC handbook of energy efficiency.* CRC Press, 1997.
0849325145

TJ175 Mallik, A. K.
Kinematic analysis and synthesis of mechanisms. CRC Press, 1994.
0849391210

TJ177 Wowk, Victor
Machinery vibration: balancing. McGraw-Hill, 1995.
0070719381

TJ177.5 Piotrowski, John
Shaft alighment handbook. 2nd ed. Marcel Dekker, 1995.
0824796667

TJ181 Chironis, Nicholas P.
Mechanisms & mechanical devices sourcebook. McGraw-Hill, 1996
0070113564

TJ184 Dooner, David B.
Kinematic geometry of gearing: a concurrent engineering approach. John Wiley, 1995.
0471045971

TJ210 Sciavicco, Lorenzo
Modeling and control of robot manipulations. McGraw-Hill, 1996
0070572178

TJ210.4 *McGraw-Hill illustrated encyclopedia of robotics & artificial intelligence.* McGraw-Hill, 1994.
0070236135

TJ211 Rosheim, Mark E.
Robot evolution: the development of anthrobotics. John Wiley, 1994.
0471026220

TJ211.4 Ahrikengheikh, Cherif
Optimized-motion planning : theory and implementation. John Wiley, 1994.
04701019038

TJ211.415 Sorenstein, J.
Navigating mobile robots: systems and techniques. AK Peters, 1996.
156881058X

TJ212.2 *Advances in control education: proceedings (1994: Tokyo).* Pergamon, 1994.
0080422306

TJ213 Anano, D. K.
Introduction to control systems. 3rd Ed. Butterworth-Heinemann, 1995.
0750622989

TJ213 Bandemer, Hans
Fuzzy sets, fuzzy logic, fuzzy methods: with applications. John Wiley,
1995.
0471956368

TJ213 Bissell, C. C.
Control engineering. Chapman & Hall. 1994.
0412577100

TJ213 Raven, Francis H.
Automatic control engineering. 5th Ed. McGraw-Hill, 1995.
0070513414

TJ214 Vounkin, George W.
Industrial servo control systems: fundamentals and applications. Marcel Dekker. 1996.
0824796861

TJ217 Astrom, Karl J.
Adaptive control. 2nd Ed. Addison-Wesley, 1995
0201558661

TJ217 Widrow, Bernard
Adaptive inverse control. Prentice-Hall, 1996.
0130059684

TJ217.5 *Intelligent control systems: theory and applications.* IEEE Press Books, 1996.
0780310632

TJ219 *Control handbook.* CRC Press, 1996.
0849385709

TJ223 Jordan, J. R.
Serial networked field instrumentation. John Wiley, 1995.
0471953261

TJ230 Norton, Robert L
Machine design: an integrated approach. Prentice-Hall, 1996.
0135554756

TJ230 *Standard handbook of machine design. 2nd Ed.* McGraw-Hill, 1996.
0070569584

TJ243 Zahavi, Eliahu
Fatigue design: life expectancy of machine parts. CRC Press, 1996.
0849389704

TJ246 Brown, Melvin W.
Seals and sealing handbook 4th Ed.. Elsevier, 1995.
1856172325

TJ246 Czernik, Daniel E.
Gasket handbook. McGraw-Hill. 1996.
007015113X

TJ246 Horve, Leslie A.
Shaft seals for dynamic applications. Marcel Dekker, 1996.
0824797167

TJ260 *Advances in engineering heat transfer.* Computational Mechanics. 1995.
1562523465

TJ260 *Heat transfer: AICHE Symposium, American Institute of Chemical Engineering, 1996.* American Institute of Chemical Engineering. 1996.
0816907056

TJ260 Lock, G. S. H.
Latent heat transfer : an introduction to fundamentals. Oxford Univ. Press, 1994.
0198562853

TJ265 Sherwin, Keith
Thermofluids. Chapman & Hall, 1996.
0412598000

TJ265 Wark, Kenneth
Advanced thermodynamics for engineers. McGraw-Hill. 1994.
0070682925

TJ266 *Handbook of turbomachinery.* Marcel Dekker. 1994.
0824792637

TJ267 Turton, R. K.
Principles of turbomachinery.2nd Ed. Chapman & Hall, 1995.
0412602105

TJ288 Carroll, Dyer E.
ASME code simplified: power boilers. McGraw-Hill, 1997.
0070116369

TJ460 *Databook on fatigue strength of metallic materials.* Elsevier, 1996.
0444825142

TJ460 Wagoner, R. H.
Fundamentals of metal forming. John Wiley, 1996.
0471570044

TJ718 Weber, H. E.
Shock wave engine design. John Wiley, 1995.
0471597244

TJ840 Reeves, William W.
Technology of fluid power. Delmar, 1997.
0827366647

TJ843 Bath International Fluid Power Workshop (7th: 1994: University of Bath).
Innovations in fluid power: seventh Bath International Fluid Power Workshop. John Wiley, 1995.
0471956580

TJ843	*Fluid power.* E. & FN. Spon/Chapman-Hall, 1993. 0419191003
TJ843	Martin, Hugh *Design of hydraulic components and systems.* Ellis Horwood, 1995. 0132971941
TJ900	Ravner, R. *Pump users handbook. 4th Ed.* Elsevier Advanced Technology/Alkemi, 1995. 1856172163
TJ900	Volk, Michael *Pump characteristics and applications.* Marcel Dekker, 1996. 0824795806
TJ919	Vedidiah, Sam *Centrifugal pump user's guidebook: problems and solutions.* Chapman & Hall, 1996. 041299111X
TJ1075	*Tribology handbook.* Butterworth-Heimenamm, 1995. 0750611987
TJ1075	Williams, J. A. *Engineering tribology.* Oxford Univ. Press, 1994. 0198563434

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A

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AEI Press
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Mexican American Studies & Research Center
University of Arkansas Press
Edward Arnold
Jason Aronson
Artabras/Abbeville
Arte Publico Press
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Ashgate Publishing Company
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Aspen Publishers
Association for Supervision and Curriculum Development*
Atheneum
Athlone Press
Atlantic Monthly Press
Auburn House
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AVI Publishing Company

B

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Bantam Trade Books
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Basic Books
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Baylor University Press
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Peter Bedrick
Belknap Press/Harvard University Press
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Bell Tower/Harmony
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Bilingual Press
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Brooks/Cole/Wadsworth
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Bulfinch Press
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Business One Irwin
Business Publications
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Butterworth-Heinemann
Heinemann Medical

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California State Univ. Press, Long Beach
University of California Press
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Cambridge University Press
Royal Society
Camden House
Campuslife Books/Zondervan
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Aristide D. Caratzas
Carcanet Press
Carleton University Press
Carnegie-Mellon University Press
Carolina Academic Press
Frank Cass
Cassell
Catholic University of America Press
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Center for Migration Studies*
Center for Urban Policy Research
University of Central Arkansas Press
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Paul Chapman
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Chelsea House
Chicago Review Press
University of Chicago Press
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National Bureau of Economic Research
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Falmer Press
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Soho Press
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Pilgrim Press/United Church Press
Pisces Books/Gulf
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Temple University Press
Ten Speed Press
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Simon & Pierre
Sister Vision
Talonbooks
Tantrum Press
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Women's Press
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Truman Talley/Dutton
Twayne Publishers
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Twin Palms

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W.E. Upjohn Institute for Employment Research
Urban Institute Press
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Utah State University Press
University of Utah Press

V

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Gustav Fischer Verlag
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Walker & Company
Warner Trade Books
Washington Institute Press
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University of Washington Press
National Gallery (London)
Tate Gallery
University of Waterloo Press
Watson-Guptill Publications
Wayne State University Press
West Publishing
West Virginia University Press
Westminster Press
Westview Press
Whitney Library of Design
Whitston
John Wiley & Sons
Wiley-Liss
Williams and Wilkins
H.W. Wilson+
Windcrest/TAB
University of Wisconsin Press
Workman Publishing Company
World Scientific Publishing Company
Wright State University Press
Wright/Butterworths
Writer's Digest Books

Y

Yale University Press
Yeshiva University Press
Youth Specialities/Zondervan

Z

Hans Zell/K.G. Saur
Zondervan Publishing House

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To : George Olsson
From : Ray Dickinson, COT Library liaison
Subject : Gift MET books
Date : March 12, 1997

Attached to this memo is a complete list of the MET books that you gave to the Ferris Library, March 11, 1997. There are 137 books listed. They are listed by author, then title, publisher and date of publication. I do not have the call number for them yet. OCLC (the national database for cataloging) was unavailable this morning when I planned on searching for their call numbers.

The 1970 International Automobile Safety Bibliography of literature through January 1970. Society of Automotive Engineers, 1970.

1992-1993 fluid power handbook & directory. Hydraulics & Pneumatics, 1992.

AIAA Guidance and Control Conference.
A collection of technical papers. American Institute of Aeronautics and Astronautics, 1980.

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Fluid mechanics. Engineering Press, 1987.

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Anderson, Herbert A., Ed.
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Andrews, Nancy
Windows : the official guide to Microsoft's operating environment. Microsoft Press, 1986.

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Annual review of fluid mechanics, v. 5. Annual Reviews, 1973.

Annual review of fluid mechanics, v. 7. Annual Reviews, 1975.

Annual review of fluid mechanics, v. 11. Annual Reviews, 1979.

Annual review of fluid mechanics, v. 12. Annual Reviews, 1980.

Annual review of fluid mechanics, v. 13. Annual Reviews, 1981.

Annual review of fluid mechanics, v. 14. Annual Reviews, 1982.

Annual review of fluid mechanics, v. 15. Annual Reviews, 1983.

Annual review of fluid mechanics, v. 16. Annual Reviews, 1984.

Annual review of fluid mechanics, v. 17. Annual Reviews, 1985.

Annual review of fluid mechanics, v. 18. Annual Reviews, 1986.

Annual review of fluid mechanics, v. 12. Annual Reviews, 1987.

Annual review of fluid mechanics, v. 20. Annual Reviews, 1988.

Annual review of fluid mechanics, v. 21. Annual Reviews, 1989.

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Bent, Robert J.
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Basic programming inside & out. Abacus, 1990.

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Buchanan, George R.
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v. 1 : Properties of sea water and electrolytes distillation processes.
v. 2 : Ionic processes.
v. 3 : Freezing processes, economic considerations.
v. 4 : Appendix.
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Annual review of Energy, v. 9. Annual Reviews, 1979.

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Model glider design. Model Aeronautic Publications, 1944.

To : Chuck Drake
From : Ray Dickinson, COT Library liaison
Subject : Gift MET books
Date : March 13, 1997

Attached to this memo is a list of the gift MET books you gave us. There are 20 books on the list. The list includes author, title, edition, publisher and date published. This collection will be added to the library along with the gift books from George Olsson in an effort to update the MET collection in the Timme Library.

If there is anything else that I can do to assist you or George in this effort, please do not hesitate to contact me.

Cook, Robert D.
Concepts and applications of finite element analysis. 2nd Ed. John Wiley, 1981.

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APPENDIX F

PRESENT LIBRARY HOLDINGS IN *TJ* AND SELECTED *TA* CLASSIFICATIONS

To : George Olsson, JH-406
From : Ray Dickinson, Librarian
Subject : MET books in library
Date : March 10, 1997

Enclosed, find photocopies of the Library of Congress classification numbers in the TA's and also find a complete list of all holdings of the Timme Library in the TJ's.

The TJ list was downloaded from PALS in the browse function, so as you can see, some of the titles are truncated. Most are not, so you can at least get a flavor of what we have from what is on the list. All call numbers in the TJ's are complete.

When you have selected those items in the TA's, please send the list back to me and I will then print out all items we have in those call numbers.

Hope you had a good break Give me a call when you are ready for the next step, or if you have any questions about what is being sent.

br ca tj

NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TH 9745.S7C64	application of security syste
0002*	4	TJ 1.A5	
			American machinist
			American machinist & automated manufacturing: AM
			American machinist
			American machinist, metalworking manufacturing
0003	1	TJ 1.E47	Modern power systems.
0004	1	TJ 1.M15	Machine design.
0005	1	TJ 1.M21	Machinery.
0006	1	TJ 1.M436	Mechanical engineering.
0007	1	TJ 1.M77	Modern machine shop.
0008	1	TJ 1.P7	Power.
0009	2	TJ 1.P77	
			Power engineering
			power generation
0010	1	TJ 5.I48	Instrumentation in the power
0011	1	TJ 9.D5	Dictionary of mechanical engi
0012	1	TJ 9.N3 1967B	Dictionary of mechanical engi
0013	1	TJ 14.P47	Philosophers and machines /
0014	1	TJ 15.B85 1965	history of mechanical enginee
0015	1	TJ 15.C6 1959	Energy and man, a symposium.
0016	1	TJ 18.K4	theatre of machines
0017	1	TJ 23.C3	mechanical engineer in Americ
0018	1	TJ 23.H67	New energy technology--some f
0019	1	TJ 130.T5H8	Timken at war,
0020	1	TJ 140.B6D5	Matthew Boulton,

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 140.D5N5	Rudolf Diesel : pioneer of th
0002	1	TJ 140.S59B7	capitalist romance : Singer a
0003	1	TJ 145.M37 1986	Machines in motion /
0004	1	TJ 146.D8 1972	Power; prime mover of technol
0005	1	TJ 146.W34	how and why of mechanical mov
0006	1	TJ 147.A9	It works like this; a collect
0007	1	TJ 147.B68	Engines and how they work.
0008	1	TJ 147.G55	Exploring power mechanics.
0009	1	TJ 147.K6	How does it work?
0010	1	TJ 147.O2	Machines,
0011	1	TJ 147.R3 1951	Great engines and their inven
0012	1	TJ 147.T48	Energy for man; windmills to
0013	1	TJ 147.W53	Energy,
0014	1	TJ 148.A496	Mechanical measurement and in
0015	1	TJ 148.T54	Mechanisms/drives
0016	1	TJ 151.A45 1971	use of handbook tables and fo
0017	1	TJ 151.A45 1975	use of handbook tables and fo
0018	1	TJ 151.C335 1965	Newnes engineer's reference b
0019	1	TJ 151.C36 1993B	Mechanical engineer's data ha
0020	1	TJ 151.E3	Mechanical engineer's referen

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 151.K4 1936	Kent's mechanical engineers'
0002	1	TJ 151.M3	Machinery's handbook.
0003	1	TJ 151.M37 1941	Mechanical engineers' handboo
0004	1	TJ 151.M37 1987	Marks' standard handbook for
0005	1	TJ 151.M395 1986	Mechanical engineers' handboo
0006	1	TJ 153.B68	Power: mechanics of energy co
0007	1	TJ 153.C43	Energy.
0008	1	TJ 153.C637	Energy crisis in America.
0009	1	TJ 153.E45	Troubleshooters' handbook for
0010	1	TJ 153.H65	Energy; a crisis in power,
0011	1	TJ 153.H85	Producing your own power; how
0012	1	TJ 153.M15	Optical tooling in industry
0013	1	TJ 153.M183	Energy resources and supply /
0014	1	TJ 153.N27 1971	U.S. energy outlook: an initi
0015	1	TJ 153.R53	Energy in the city environmen
0016	1	TJ 153.S67	fires of culture : energy yes
0017	1	TJ 153.S76	Power mechanics.
0018	1	TJ 153.S76 1973	Power technology
0019	1	TJ 153.W58 1966	new century of inventions, be
0020	1	TJ 159.L5 1994	Mechanical engineering refere

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 159.5.M3 1994	investigation into the Wright
0002	1	TJ 163.16.E53 1981	Energy reference handbook /
0003	1	TJ 163.165.W67 1985	World energy directory : a gu
0004	1	TJ 163.2.A45	Alternative energy sources : [
0005	1	TJ 163.2.A47 1978	Living with energy /
0006	1	TJ 163.2.A55	Annual review of energy.
0007	1	TJ 163.2.C37 1976	Energy and the earth machine
0008	1	TJ 163.2.D37 1983	Energy, today and tomorrow : l
0009	1	TJ 163.2.D49 1978	It's in your power : the conc
0010	1	TJ 163.2.D5	electric wishing well : the s
0011	1	TJ 163.2.D65	Energy : a crisis, a dilemma,
0012	1	TJ 163.2.D66	energy factbook /
0013	1	TJ 163.2.D67	Energy, resources & policy /
0014	1	TJ 163.2.D68 1988	Energy and the missing resour
0015	1	TJ 163.2.E44	Energy.
0016	1	TJ 163.2.E46	Energy and man : technical an
0017	1	TJ 163.2.E47	Energy : demand vs. supply /
0018	1	TJ 163.2.E4822	Energy information abstracts
0019	1	TJ 163.2.E5	Energybook /
0020	1	TJ 163.2.E53	Energy crisis : papers submit

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 163.2.F55 1994	Power surge : guide to the co
0002	1	TJ 163.2.H3	At home with alternative ener
0003	1	TJ 163.2.H4 1986	World energy, the facts and t
0004	1	TJ 163.2.H72 1980	Commonsense in nuclear energy
0005	1	TJ 163.2.H87	Energy dictionary /
0006	1	TJ 163.2.I55 1981	Energy in a finite world : re

0007	1	TJ 163.2.K46	Potential energy : an analysi
0008	1	TJ 163.2.L63	Energy handbook /
0009	1	TJ 163.2.L675	Energy/war, breaking the nucl
0010	1	TJ 163.2.L678	Soft energy paths : toward a
0011	1	TJ 163.2.L68 1975	World energy strategies : fac
0012	1	TJ 163.2.M28	How to obtain abundant clean
0013	1	TJ 163.2.M3	McGraw-Hill encyclopedia of e
0014	1	TJ 163.2.M3 1981	McGraw-Hill encyclopedia of e
0015	1	TJ 163.2.M425 1991	Handbook of energy engineerin
0016	1	TJ 163.2.M6413 1979	Energy, the countdown : a rep
0017	1	TJ 163.2.P48	Perspectives on the energy cr
0018	1	TJ 163.2.P74 1979	Energy for a technological so
0019	1	TJ 163.2.P74 1991	Energy-- principles, problems
0020	1	TJ 163.2.S74	Energy, environment and build

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NMBR COUNT (CA)---------INDEX KEY----------- ------------TITLE-----------

0001	1	TJ 163.2.T4	Energy from heaven and earth
0002	1	TJ 163.2.W64 1985	Opportunities in energy caree
0003	1	TJ 163.2.W653 1977	Energy : global prospects, 19
0004	1	TJ 163.2.W69	World energy, the facts and t
0005	1	TJ 163.2.W95 1982	Managing corporate energy nee
0006	1	TJ 163.235.E53 1995	Encyclopedia of energy techno
0007	1	TJ 163.235.L64 1984	Energy handbook /
0008	1	TJ 163.235.M55 1993	Energy and American society :
0009	1	TJ 163.24.E53	Energy book : a look at the d
0010	1	TJ 163.24.N67	Notes from the energy undergr
0011	1	TJ 163.25.M6M47 1985	Mexico's energy resources : t
0012	1	TJ 163.25.U6A45 1980	Two energy futures : a nation
0013	1	TJ 163.25.U6C83	United States energy atlas /
0014	1	TJ 163.25.U6D58 1977B	Energy : a critical decision
0015	1	TJ 163.25.U6E55	Energy source book /
0016	1	TJ 163.25.U6H47 1977	Energy futures : industry and
0017	1	TJ 163.25.U6K73	Energy, from opulence to suff
0018	1	TJ 163.25.U6L36	America's energy /
0019	1	TJ 163.25.U6M58	Energy--and how we lost it /
0020	1	TJ 163.25.U6N382 1980	Energy in transition, 1985-20

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NMBR COUNT (CA)---------INDEX KEY----------- ------------TITLE-----------

0001	1	TJ 163.25.U6P76	Prospects for energy in Ameri
0002	1	TJ 163.3.D47	How to cut your energy bills
0003	1	TJ 163.3.E3 1978	Efficient electricity use : a
0004	1	TJ 163.3.E435 1993	Energy design handbook /
0005	1	TJ 163.3.E5	Energy efficiency in building
0006	1	TJ 163.3.E547	Energy conservation : a natio
0007	1	TJ 163.3.E547 1977	Energy savers catalog /
0008	1	TJ 163.3.E63 1977	Energy conservation studies i
0009	1	TJ 163.3.F72 1974	Energy: the new era
0010	1	TJ 163.3.F74	contrasumers; a citizen's gui
0011	1	TJ 163.3.H68	How to shrink your energy bil
0012	1	TJ 163.3.M33 1983	Efficient energy management :
0013	1	TJ 163.3.P74	Homeowner's guide to saving e
0014	1	TJ 163.3.R3	Living for the future : perso

0015	1	TJ 163.3.R57	Sourcebook for farm energy al
0016	1	TJ 163.3.S55	Industrial energy management
0017	1	TJ 163.3.T48 1974	350 ways to save energy (and
0018	1	TJ 163.3.T49	Handbook of energy audits /
0019	1	TJ 163.3.W53 1979	Recent energy developments : s
0020	1	TJ 163.4.U6F91	Lifestyle index

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE------------
0001	1	TJ 163.4.U6H39	Energy : the case for conserv
0002	1	TJ 163.4.U6H42	Energy conservation strategie
0003	1	TJ 163.4.U6N37 1974	Potential for energy conserva
0004	1	TJ 163.4.U6P52	Lifestyle index-77 /
0005	1	TJ 163.5.A37F74	Energy conservation for Ameri
0006	1	TJ 163.5.B84B37	Manual of energy saving in ex
0007	1	TJ 163.5.B84B87 1978	Building for energy conservat
0008	1	TJ 163.5.B84E54	Energy conservation through b
0009	1	TJ 163.5.B84L46 1992	Building energy management sy
0010	1	TJ 163.5.B84L57 1984	Design with energy : the cons
0011	1	TJ 163.5.B84R44 1985	financial evaluation of energ
0012	1	TJ 163.5.B84R47 1984	Retrofitting of commercial, i
0013	1	TJ 163.5.B84R47 1994	Retrofitting of buildings for
0014	1	TJ 163.5.B84T58 1994	Energy management guide for g
0015	1	TJ 163.5.B84M421980	Energy conservation in buildi
0016	1	TJ 163.5.C54P76 1982	Process energy conservation /
0017	1	TJ 163.5.C65N37	Code for energy conservation
0018	1	TJ 163.5.D86A24	Your guide to energy-saving h
0019	1	TJ 163.5.D86A73 1978	complete energy-saving home i
0020	1	TJ 163.5.D86A73 1979	complete energy-saving home i

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 163.5.D86A75	Well-tempered house : energy-
0002	1	TJ 163.5.D86B37	How to really save money and
0003	1	TJ 163.5.D86D38	Wage the energy war at home /
0004	1	TJ 163.5.D86E515 1982	Energy alternatives /
0005	1	TJ 163.5.D86E53 1979	Energy-saving projects you ca
0006	1	TJ 163.5.D86H45 1980	Energy-saving projects for th
0007	1	TJ 163.5.D86H53	Building & remodeling for ene
0008	1	TJ 163.5.D86I57	Energy cost reduction for apa
0009	1	TJ 163.5.D86J66	How to cut heating and coolin
0010	1	TJ 163.5.D86K58	home energy saver : all the f
0011	1	TJ 163.5.D86K64	Money saving conservation pro
0012	1	TJ 163.5.D86N37 1978	Passive design ideas for the
0013	1	TJ 163.5.D86U23 1980	Al Ubell's Energy-saving guid
0014	1	TJ 163.5.D86W34 1982	energy efficient home--101 mo
0015	1	TJ 163.5.D86W37	Inflation fighter's big book
0016	1	TJ 163.5.D86W64	Home energy for the eighties
0017	1	TJ 163.5.D86A731979	complete energy-saving home i
0018	1	TJ 163.5.F3T48 1977	Plant engineers and managers
0019	1	TJ 163.5.O35A93 1994	Audubon House : the building
0020	1	TJ 163.5.S623 1994	Energy in world history /

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 163.6.E53	Energy engineering : journal
0002	1	TJ 163.9.E54	Energy technology handbook /
0003	1	TJ 163.9.G7	Modern power mechanics /
0004	1	TJ 163.9.I59	Introduction to energy techno
0005	1	TJ 163.9.T54 1984	Fundamentals of energy engine
0006	1	TJ 164.A52	Report on diesel and gas engi
0007	1	TJ 164.E4 1965	Plant operators' manual.
0008	1	TJ 164.E4 1975	Standard plant operators' man
0009	1	TJ 164.E42 1981	Standard plant operator's que
0010	1	TJ 164.H38 1967	Analysis of engineering cycle
0011	1	TJ 175.B33	Advanced mechanism.
0012	1	TJ 175.D48	Motion geometry of mechanisms
0013	1	TJ 175.D68	Elements of mechanism
0014	1	TJ 175.G55 1990	Basic kinematics and applicat
0015	1	TJ 175.H213 1967	Applied kinematics.
0016	1	TJ 175.H233	Introduction to kinematics /
0017	1	TJ 175.H684 1968	Dynamics of machinery.
0018	1	TJ 175.H685	Kinematics and dynamics of pl
0019	1	TJ 175.L37 1970	Analysis and design of mechan
0020	1	TJ 175.M123 1963	Mechanisms and dynamics of ma

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 175.M84 1993	Modern kinematics : developme
0002	1	TJ 175.R34	Applied kinematics
0003	1	TJ 175.S493 1969	Kinematic analysis of mechani
0004	1	TJ 175.S93	Kinematics and mechanisms des
0005	1	TJ 175.W76	Mechanism: design-oriented ki
0006	1	TJ 175.W79	Mechanism; fundamental theory
0007	1	TJ 175.Z48	Elementary kinematics of mech
0008	1	TJ 181.B5	Mechanisms for intermittent m
0009	1	TJ 181.C399 1991	Mechanisms & mechanical devic
0010	1	TJ 181.C4	Mechanisms, linkages, and mec
0011	1	TJ 181.5.O9	Wheels,
0012	1	TJ 181.5.S32	On wheels /
0013	1	TJ 182.T25	Applied linkage synthesis.
0014	1	TJ 184.C53	Gear design and application.
0015	1	TJ 184.D77	evolution of the gear art,
0016	1	TJ 184.D78	Gear handbook: the design, ma
0017	1	TJ 184.E53 1990	Gear hobbing, shaping, and sh
0018	1	TJ 184.M47	Precision gearing: theory and
0019	1	TJ 184.S76 1995	Encyclopedic dictionary of ge
0020	1	TJ 184.W37 1970	Modern gear production

CATALOG-FSU=>bf

NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 185.B76	Gear ratio tables for 4-6-and
0002	1	TJ 185.B8 1962	Manual of gear design /
0003	1	TJ 185.P3 1961	14,000 gear ratios; tabulated
0004	1	TJ 187.W6 1964	History of the gear-cutting m
0005	1	TJ 200.B8	Design of worm and spiral gea
0006	1	TJ 206.J48	Cam design and manufacture

0007	1	TJ 206.K6513 1993	Cam mechanisms /
0008	1	TJ 206.N4	Mechanisms and cams for autom
0009	1	TJ 206.R82	Cams: design, dynamics, and a
0010	1	TJ 210.G7713 1966	Calculation and design of met
0011	1	TJ 210.W3 1963	Mechanical springs.
0012	1	TJ 210.2.W67	World yearbook of robotics re
0013	1	TJ 210.3.I56 1987	Intelligent robots and comput
0014	1	TJ 210.5.R63 1984	Robotics CAD/CAM market place
0015	1	TJ 211.A83 1985	Robots, machines in man's ima
0016	1	TJ 211.B86 1986	Robots and free minds /
0017	1	TJ 211.C26 1985	Robotics /
0018	1	TJ 211.C6 1967	Human robots in myth and scie
0019	1	TJ 211.C85	Make your own robots /
0020	1	TJ 211.H34 1985	Fundamentals of robotics : th

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE------------
0001	1	TJ 211.H35 1987	Build your own working robot
0002	1	TJ 211.H65 1986	Robotic technology, principle
0003	1	TJ 211.H85 1988	Robotics sourcebook /
0004	1	TJ 211.L63 1984	robot revolution /
0005	1	TJ 211.M34	robot book /
0006	1	TJ 211.M36 1985	personal robot book /
0007	1	TJ 211.M418 1987	robot builder's bonanza : 99
0008	1	TJ 211.R43 1985	Introduction to robotics : a
0009	1	TJ 211.R44 1978	Robots : fact, fiction, and p
0010	1	TJ 211.R535 1988	Robot design handbook /
0011	1	TJ 211.R55 1983	Robotic technology /
0012	1	TJ 211.R557 1985	Robotics /
0013	1	TJ 211.R568 1984	Robotics research : the first
0014	1	TJ 211.R66 1985	Introduction to robot program
0015	1	TJ 211.T44 1985	Teleoperated robotics in host
0016	1	TJ 211.Z45 1984	What every engineer should kn
0017	1	TJ 211.15.F54 1986	tomorrow makers : a brave new
0018	1	TJ 211.15.K45 1986	layman's introduction to robo
0019	1	TJ 211.15.S45 1986	Build a remote-controlled rob
0020	4	TJ 212.A8	
			Penton's controls & systems
			Automation
			Production engineering
			Automation

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0001	1	TJ 212.C58	Computers and people.
0002	1	TJ 212.C6	Control engineering.
0003	1	TJ 212.M5	Digital computer applications
0004	1	TJ 212.S97	Computerized process control
0005	1	TJ 213.A67	100 process control systems,
0006	1	TJ 213.B33 1980	Introduction to control syste
0007	1	TJ 213.B456 1993	history of control engineerin
0008	1	TJ 213.B64	Control systems: analysis, de
0009	1	TJ 213.C54	Machine devices and instrumen
0010	1	TJ 213.C86 1984	Handbook of remote control &

0011	1	TJ 213.G72	Handbook of automation, compu
0012	1	TJ 213.H375 1967B	Principles of automatic contr
0013	1	TJ 213.H4	Automatic control basics; des
0014	1	TJ 213.I54	Instrumentation & control sys
0015	1	TJ 213.L25	Process control analysis,
0016	1	TJ 213.L34	introduction to optimal contr
0017	1	TJ 213.L37	Computer control systems tech
0018	1	TJ 213.M297	Automatic industrial controls
0019	1	TJ 213.M3413	origins of feedback control.
0020	1	TJ 213.M353 1993	Fuzzy logic /

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 213.M55	Control engineering
0002	1	TJ 213.O47	Optimal control.
0003	1	TJ 213.P36	Technology of instrumentation
0004	1	TJ 213.R38 1968	Automatic control engineering
0005	1	TJ 213.R8	Automation in practice.
0006	1	TJ 213.S119	Computer control of industria
0007	1	TJ 213.S4	Control systems engineering.
0008	1	TJ 213.S415	Most notorious victory: man i
0009	1	TJ 213.T6	Digital and sampled-data cont
0010	1	TJ 213.T72	Control engineers' handbook; s
0011	1	TJ 213.W35	Control instrument mechanisms
0012	1	TJ 213.W36	Introduction to control syste
0013	1	TJ 213.W38	Machines and the man; a sourc
0014	1	TJ 213.Z43	Automatic control systems.
0015	1	TJ 213.8.P76 1983	Problem solver in automatic c
0016	1	TJ 214.B28	Practical servomechanism desi
0017	1	TJ 214.B75	Basic servomechanisms.
0018	1	TJ 214.B765	Servomechanisms
0019	1	TJ 214.C49	Modern analytical design of i
0020	1	TJ 214.H85	Introduction to servomechanis

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 214.J3 1965	Theory of servomechanisms.
0002	1	TJ 214.J6	Servomechanisms.
0003	1	TJ 216.A54 1973	Closing the loop; the story o
0004	1	TJ 216.M3	Introduction to feedback syst
0005	1	TJ 216.M36	Feedback and control systems
0006	1	TJ 216.R36	Complex digital control syste
0007	1	TJ 216.S3 1964	Control system design.
0008	1	TJ 216.S46 1994	Feedback controllers for the
0009	1	TJ 216.W47	Analytical techniques for non
0010	1	TJ 216.W48	analysis of feedback systems
0011	1	TJ 217.A67 1995	Adaptive control /
0012	1	TJ 217.5.D47 1995	Intelligent control : fuzzy l
0013	1	TJ 218.5.T7513 1984	Relay control systems /
0014	1	TJ 223.M3A66 1984	third annual applied machine
0015	1	TJ 223.M53H68 1985	Digital control systems--theo
0016	1	TJ 223.M53I53 1986	Industrial digital control sy
0017	1	TJ 223.M53P47 1995	Digital control system analys
0018	1	TJ 223.M53S26 1994	Digital control system design

0019	1	TJ 223.M53S63 1996	Microcontroller technology : t
0020	1	TJ 223.M53T65 1995	PC-based instrumentation and

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 223.P76B38 1988	Programmable controllers : ha
0002	1	TJ 223.P76B38 1994	Programmable controllers : ha
0003	1	TJ 223.P76B79 1987	Programmable controllers : se
0004	1	TJ 223.P76B795 1988	Programmable controllers : th
0005	1	TJ 223.P76C65 1986	Proceedings of the Conference
0006	1	TJ 223.P76C69 1984	Technician's guide to program
0007	1	TJ 223.P76G5 1979	Glossary of programmable cont
0008	1	TJ 223.P76H55 1992	Microcontrollers : architectu
0009	1	TJ 223.P76I58 1986	International programmable co
0010	1	TJ 223.P76W43 1995	Programmable logic controller
0011	1	TJ 223.T4R6	Fundamentals of temperature c
0012	1	TJ 223.T7A44	Electromechanisms/transducers
0013	1	TJ 223.T7A45 1984	Transducers : theory and appl
0014	1	TJ 223.T7A53 1985	transducer project book /
0015	1	TJ 223.T7S95 1980	Transducers in measurement an
0016	1	TJ 223.T7W36 1985	Fundamentals of transducers /
0017	1	TJ 223.V3G5	Control valves.
0018	1	TJ 223.V3I22	ISA handbook of control valve
0019	1	TJ 223.V3I22 1976	ISA handbook of control valve
0020	1	TJ 227.M35	Drafting room manual. /

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 227.2.M48 1989	Metric practice guide for the
0002	1	TJ 230.B58 1968	Machine design
0003	1	TJ 230.B94 1995	Mechanical analysis and desig
0004	1	TJ 230.C83 1976	Machine design /
0005	1	TJ 230.D45	Machine design; theory and pr
0006	1	TJ 230.L559	Machine design /
0007	1	TJ 230.L718 1994	Machine design data handbook
0008	1	TJ 230.M23 1983	Machine design fundamentals,
0009	1	TJ 230.P28	Principles of mechanical desi
0010	1	TJ 230.P36 1965	Engineering drawing,
0011	1	TJ 230.P47 1970	Fundamentals of mechanical de
0012	1	TJ 230.R78	Elements of machine design
0013	1	TJ 230.R785	Mechanical design and systems
0014	1	TJ 230.S5 1977	Mechanical engineering design
0015	1	TJ 230.S53 1965	Mechanical design of machines
0016	1	TJ 230.S82 1971	Design of machine elements
0017	1	TJ 230.S82 1978	Design of machine elements : i
0018	1	TJ 230.S823	Mechanical design analysis
0019	1	TJ 230.S8235 1986	Standard handbook of machine
0020	1	TJ 230.V3 1943	Design of machine members

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 230.W75	Machine design. A text presen
0002	1	TJ 233.A57	ASME handbook.
0003	1	TJ 233.A572	ASME handbook.

0004	1	TJ 233.B64	Design of weldments.
0005	1	TJ 233.J3	Arc welding in machinery desi
0006	1	TJ 233.J33	Design ideas for weldments.
0007	1	TJ 233.L49	Aids to efficient machine des
0008	1	TJ 233.P76C58 1996	PLC workbook : programmable l
0009	1	TJ 233.R74 1970	Design for strength and produ
0010	1	TJ 240.G7	Pictorial handbook of technic
0011	1	TJ 243.W55	Introduction to group technol
0012	1	TJ 246.D34	Mechanical face seal handbook
0013	1	TJ 248.B8	Simple working models of hist
0014	1	TJ 249.S65	Handbook of machine foundatio
0015	1	TJ 250.D33	Engines : the search for powe
0016	1	TJ 250.W6	General power mechanics
0017	1	TJ 253.T5 1970	Engine analysis /
0018	1	TJ 255.A6 1941	Heat engines; steam, gas, ste
0019	1	TJ 255.D47	Your book of engines and turb
0020	1	TJ 255.D48	Heat engines,

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 255.S4 1954	Steam, air, and gas power
0002	1	TJ 255.W7 1960	theory and practice of heat e
0003	1	TJ 260.E3 1967	introduction to heat transfer
0004	1	TJ 260.G6413 1986	Technical guide to thermal pr
0005	1	TJ 260.K78	Temperature control.
0006	1	TJ 260.S315 1981	Thermal energy storage and re
0007	1	TJ 260.S57	introduction to engineering h
0008	1	TJ 262.S88 1994	Heat pumps : installation and
0009	1	TJ 262.U52 1976	Standard for heat pumps.
0010	1	TJ 262.W6 1975	Solar energy heat pump system
0011	1	TJ 263.H395 1986	Heat exchanger sourcebook /
0012	1	TJ 264.I58 1990	Heat pipe technology : procee
0013	1	TJ 265.B115	Applied thermodynamics
0014	1	TJ 265.B87	Engineering thermodynamics wi
0015	1	TJ 265.C33	From Watt to Clausius; the ri
0016	1	TJ 265.C86	Thermodynamics for engineers
0017	1	TJ 265.F3 1978	Thermodynamics /
0018	1	TJ 265.G697 1980	Thermodynamics and heat power
0019	1	TJ 265.G697 1985	Thermodynamics and heat power
0020	1	TJ 265.H34 1951	Thermodynamics.

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 265.H726 1987	Fundamentals of engineering t
0002	1	TJ 265.P45	Thermofluid mechanics
0003	1	TJ 265.P56	Concise applied thermodynamic
0004	1	TJ 265.R38 1977	Engineering thermodynamics /
0005	1	TJ 265.S25	Heat engines.
0006.	1	TJ 265.S383 1966	Thermodynamics; principles an
0007	1	TJ 265.S57	Basic thermodynamics: element
0008	1	TJ 265.S8513 1965	Technical thermodynamics
0009	1	TJ 265.T4574 1985	Thermodynamics exam file /
0010	1	TJ 267.S28	Gas machinery
0011	1	TJ 270.K38	Thermodynamic properties of s

0012	1	TJ 275.R5 1950	Heat engines.
0013	1	TJ 283.A512 1988	American boiler industry : a
0014	1	TJ 285.C7	Boilers,
0015	1	TJ 289.S6 1981	Boiler operator's guide : boi
0016	1	TJ 290.S3	Design of high pressure steam
0017	1	TJ 315.B2A3 1955	Steam, its generation and use
0018	1	TJ 320.R44	Furnace operations,
0019	1	TJ 379.G47 1976	traitement des eaux : destine
0020	1	TJ 379.P5	Practical boiler water treatm

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0001	1	TJ 415.K55	Piping handbook
0002	1	TJ 415.T48	Fundamentals of pipe drafting
0003	1	TJ 415.W3 1939	Piping handbook,
0004	1	TJ 438.P64	Yarway industrial steam trapp
0005	1	TJ 461.D5 1963	short history of the steam en
0006	1	TJ 461.P79	Early stationary steam engine
0007	1	TJ 461.R6 1963A	Thomas Newcomen : the prehis
0008	1	TJ 461.S76	simple history of the steam e
0009	1	TJ 461.W3 1968B	stationary steam engine.
0010	1	TJ 557.P68 1981	Power condenser heat transfer
0011	1	TJ 603.A599	American locomotives : a pict
0012	1	TJ 603.A6 1941B	Iron horses : American locomo
0013	1	TJ 603.C273 1972	4-8-0 tender locomotives
0014	1	TJ 603.C587	iron horse
0015	1	TJ 603.E398 1981	lore of the train /
0016	1	TJ 603.K6	Chicago and North Western Rai
0017	1	TJ 603.M583	Diesels west! The evolution o
0018	1	TJ 603.N5685 1970	Railways at the zenith of ste
0019	1	TJ 603.N5687 1971	Railways in the years of pre-
0020	1	TJ 603.O4 1956	first quarter-century of stea

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0001	1	TJ 603.S55 1965A	C & O power : steam and diese
0002	1	TJ 603.S6 1970	Development of the locomotive
0003	1	TJ 603.W526	American locomotives; an engi
0004	1	TJ 603.Z53	twilight of world steam
0005	1	TJ 605.B78	steam locomotive in America: i
0006	1	TJ 605.Z55	Steam in the sixties,
0007	1	TJ 608.A65	man from Steamtown; the story
0008	1	TJ 619.O394	Diesel years /
0009	1	TJ 619.P47	Diesel spotter's guide.
0010	1	TJ 625.B2	Diesels from Eddystone : the
0011	1	TJ 630.M55	Model railway engines
0012	1	TJ 695.I5 1968	Steam locomotives in industry
0013	1	TJ 700.B4	Traction engines and steam ve
0014	1	TJ 700.H79 1968	century of traction engines:
0015	1	TJ 712.J45	Farm steam shows: USA & Canad
0016	1	TJ 755.B46 1979B	Internal combustion engines :
0017	1	TJ 755.G36 1996	Internal combustion engines /
0018	1	TJ 755.H45 1988	Internal combustion engine fu
0019	1	TJ 755.L795	Internal-combustion engines; t

0020 1 TJ 759.F8 1982 Fuels and lubricants for inte

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 759.P65 1995	Engine testing : theory and p
0002	1	TJ 759.S6 1955A	Some fundamentals of combusti
0003	1	TJ 765.W34	Stirling-cycle machines,
0004	1	TJ 770.B46 1977	Performance objectives, crite
0005	1	TJ 770.S84 1973	Small gasoline engines
0006	1	TJ 774.W313	Rotary piston machines; class
0007	1	TJ 776.W44 1975	Small gas engines : how to re
0008	1	TJ 777.F3G8	Farm engines and tractors.
0009	1	TJ 778.B34 1996	Fundamentals of gas turbines
0010	1	TJ 778.J45 1969	Gas turbine analysis and prac
0011	1	TJ 778.L417 1983	Gas turbine combustion /
0012	1	TJ 785.A52 1977	Gas engine manual /
0013	1	TJ 785.C76	Small engines: operation and
0014	1	TJ 785.D68	repair and maintenance of sma
0015	1	TJ 785.O54	Internal-combustion engines,
0016	1	TJ 785.O55	Simple gasoline engine repair
0017	1	TJ 785.P5	Small gasoline engines traini
0018	1	TJ 785.P5 1973	Small gasoline engines traini
0019	1	TJ 785.R52 1968	high-speed internal-combustio
0020	1	TJ 785.S313 1965	internal combustion engine

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0001	1	TJ 787.L35	Carburetors & carburetion
0002	1	TJ 789.C48 1974	Chilton's repair and tune-up
0003	1	TJ 789.D38	Servicing small gasoline engi
0004	1	TJ 789.D4	Fundamentals of service : eng
0005	1	TJ 789.D4 1980	Fuels, lubricants and coolant
0006	1	TJ 789.D4 1985	Fuels, lubricants and coolant
0007	1	TJ 789.D43 1984	How to repair Briggs & Stratt
0008	1	TJ 789.D43 1994	How to repair Briggs & Stratt
0009	1	TJ 789.D45 1976	How to repair small gasoline
0010	1	TJ 789.G66	Small gas engines /
0011	1	TJ 789.M36	Model four stroke petrol engi
0012	1	TJ 789.S48 1969	Small engines & chain saws, f
0013	1	TJ 789.S48 1973	Small engines & chain saws : f
0014	1	TJ 789.S5 1973	Small engines service manual.
0015	1	TJ 789.S5 1976	Small engines service manual.
0016	1	TJ 789.S56 1971	Valve mechanisms for high-spe
0017	1	TJ 789.T39	Forest H. Belt's easi-guide t
0018	1	TJ 789.T392	Small engines maintenance & r
0019	1	TJ 789.T87 1979	Small engines /
0020	1	TJ 790.C483 1979	Chilton's repair & tune-up gu

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 790.D44 1985	How to troubleshoot & repair
0002	1	TJ 790.D68	Small gasoline engines : main
0003	1	TJ 790.N67 1971	Wankel engine: design, develo
0004	1	TJ 790.S58 1982	Small engines /

0005 1 TJ 790.S584 1987 Small engines : operation, ma
0006 8 TJ 795.A1D5

Truck fleet management
DES
Diesel equipment superintendent : DES
DES
Diesel equipment superintendent
Equipment superintendent
Diesel power
Diesel power and diesel transportation

0007 1 TJ 795.A1E37 EGSA buyer's guide & member s
0008 1 TJ 795.B53 1966 Audels diesel engine manual,
0009 1 TJ 795.B66 1996 Modern diesel technology /
0010 1 TJ 795.B77 1965 British diesel engine catalog
0011 1 TJ 795.C37 1985 catalog of performance object
0012 1 TJ 795.D432 1972 Standard practices for low an
0013 2 TJ 795.D48

Diesel progress engines & drives
Diesel progress North American

0014 2 TJ 795.D568

Diesel and gas turbine worldwide catalog
Diesel and gas turbine catalog : worldwide engine power products directory and buyers guide

0015 1 TJ 795.F45 1967 Diesel vehicles: a practical
0016 1 TJ 795.K3 1965 Diesel and high-compression g
0017 1 TJ 795.K45 1987 Diesel engine mechanics /
0018 1 TJ 795.M55 1952 Modern Diesel; high-speed com
0019 1 TJ 795.M55 1972 modern diesel: development an
0020 1 TJ 795.O63 Operating experience of high-

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NMBR	COUNT	(CA)---------INDEX KEY------------	------------TITLE------------
0001	1	TJ 795.S495 1972	Questions and answers on dies
0002	1	TJ 795.S76 1968	Diesel fault tracing maintena
0003	1	TJ 795.S84 1972	Diesel engineering handbook.
0004	1	TJ 795.T49 1974	Diesel mechanic : a supervise
0005	1	TJ 795.T62	Diesel; fundamentals, service
0006	1	TJ 795.T62 1977	Diesel : fundamentals, servic
0007	1	TJ 795.V44 1962	V8 shop manual /
0008	1	TJ 795.5.C3533	Caterpillar D318 engine : ope
0009	1	TJ 795.5.C48 1965	Cummins diesel C and J series
0010	1	TJ 795.5.C85 1965	Cummins diesel H and NH serie
0011	1	TJ 795.5.I67 1966	UD-817, UDT-817 engines and a
0012	1	TJ 795.5.S63 1987	Small diesel engine service m
0013	1	TJ 797.B8	Burning a wide range of fuels
0014	1	TJ 798.F84 1984	Heavy duty diesel lubrication
0015	1	TJ 799.B7	Engine noise, analysis and co
0016	1	TJ 799.D33	Diesel engine repair /
0017	1	TJ 799.D44	How to repair diesel engines
0018	1	TJ 799.D466 1984	Detroit diesel engines, serie
0019	1	TJ 799.D467 1984	Detroit diesel engines, serie
0020	1	TJ 799.D47 1984	Detroit diesel engines, V-71

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0001	1 TJ 799.S38	Diesel mechanics /
0002	1 TJ 810.A27 1993	Active solar systems /
0003	1 TJ 810.A79 1977	Solar architecture : proceedi
0004	1 TJ 810.B34 1979	Sunspots : an exploration of
0005	1 TJ 810.B37 1979	John Barling's Solar fun book
0006	1 TJ 810.B43	Solar energy : the awakening
0007	1 TJ 810.B88	golden thread : 2500 years of
0008	1 TJ 810.C76 1976	Sun, Earth : how to use solar
0009	1 TJ 810.D28	Direct use of the sun's energ
0010	1 TJ 810.D8	Solar energy thermal processe
0011	1 TJ 810.E9 1977	Solar energy : a biased guide
0012	1 TJ 810.H29	coming age of solar energy,
0013	1 TJ 810.H5	Handbook of solar and wind en
0014	1 TJ 810.I57A	Proceedings of the annual mee
0015	1 TJ 810.M32 1979	passive solar energy book /
0016	1 TJ 810.M32 1979B	passive solar energy book : a
0017	1 TJ 810.M51	Membership directory of the M
0018	1 TJ 810.M52	Solar energy utilization /
0019	1 TJ 810.M56 1979	solar decision book : a guide
0020	1 TJ 810.O36	implementation of State solar

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NMBR	COUNT (CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1 TJ 810.P37	Solar energy for heating and
0002	1 TJ 810.P6 1979	Solar energy handbook : theor
0003	1 TJ 810.R313	Solar energy.
0004	1 TJ 810.S35	Solar installer's training pr
0005	1 TJ 810.S59	Solar age catalog : a guide t
0006	1 TJ 810.S62463	Solar energy intelligence rep
0007	2 TJ 810.S636	
		Solar engineering and contracting
		Solar engineering magazine
0008	1 TJ 810.S64	Solar industry index : the co
0009	1 TJ 810.S64 1975	Solar energy research /
0010	1 TJ 810.S66	Solar engineering master cata
0011	1 TJ 810.S93	Solar energy : one way to cit
0012	1 TJ 810.W54	Solar energy: technology and
0013	1 TJ 820.G56 1995	Wind energy comes of age /
0014	1 TJ 823.F7 1972	Windmills and millwrighting.
0015	1 TJ 823.R48	Windmills & watermills
0016	1 TJ 825.B36 1975B	Windmills /
0017	1 TJ 825.H6 1983	Horizontal-axis wind system r
0018	1 TJ 825.Y6 1987	Methodology for control and o
0019	1 TJ 840.B3	Mobile hydraulics manual: M-2
0020	1 TJ 840.F5	Fluid power and control syste

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NMBR	COUNT (CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1 TJ 840.L4	Design of hydraulic control s
0002	1 TJ 840.N48	Fluid power for technicians
0003	1 TJ 840.P4	Basic fluid power
0004	1 TJ 840.P52 1970	Industrial hydraulics

0005	1	TJ 840.S74	ABC's of fluid power
0006	1	TJ 840.S882	Fluid power : theory & applic
0007	1	TJ 840.V5	Industrial hydraulics manual,
0008	1	TJ 843.B7 1972B	Hydraulic systems and mainten
0009	1	TJ 843.D4 1972	Hydraulics.
0010	1	TJ 843.E86 1980	Fluid power with applications
0011	1	TJ 843.H42 1982	Industrial fluid power /
0012	1	TJ 843.L32	Fluid clutches and torque con
0013	1	TJ 843.O76	Basic applied fluid power: hy
0014	1	TJ 843.S74 1963	Hydraulic and pneumatic power
0015	1	TJ 843.S74 1977	Hydraulic and pneumatic power
0016	1	TJ 843.W59 1977	Fundamentals of fluid power /
0017	1	TJ 844.G57	Mobile hydraulic testing
0018	1	TJ 853.R63 1979	Fluid power logic circuit des
0019	1	TJ 859.F65	mill /
0020	1	TJ 859.F65 1976	mill /

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0001	1	TJ 859.K4	Highland mills.
0002	1	TJ 900.B64 1970	Pumps,
0003	1	TJ 900.B64 1977	Pumps /
0004	1	TJ 900.H5	Pump selection and applicatio
0005	1	TJ 900.H5 1971	Pump application engineering
0006	1	TJ 900.W23	Pump selection; a consulting
0007	1	TJ 903.E9	This is a story of the pump a
0008	1	TJ 919.K37	Engineers' guide to centrifug
0009	1	TJ 930.M698 1990	Buried pipe design /
0010	1	TJ 935.J46	Analysis of flow in pipe netw
0011	1	TJ 940.B33	High vacuum engineering.
0012	1	TJ 940.C38 1970B	Vacuum technology; an introdu
0013	1	TJ 940.D42	Vacuum system design,
0014	1	TJ 940.G7	design and construction of sm
0015	1	TJ 940.G8	Vacuum technology.
0016	1	TJ 940.P6 1966A	High vacuum pumping equipment
0017	1	TJ 940.V258 1994	Vacuum science and technology
0018	1	TJ 950.F52	Fluid power handbook & direct
0019	1	TJ 960.A6 1959	Design of industrial exhaust
0020	1	TJ 960.C2 1961	Fan engineering : an engineer

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0001	1	TJ 985.C6 1954	Compressed air handbook; a re
0002	1	TJ 985.O5 1939	Compressed air data; handbook
0003	1	TJ 985.T35 1993	Compressed air systems : a gu
0004	1	TJ 1015.K7	Pneumatic conveying of bulk m
0005	1	TJ 1015.S75	Pneumatic conveying
0006	1	TJ 1025.B47	Flow and fan - principles of
0007	1	TJ 1045.D43 1977	Power trains.
0008	1	TJ 1045.M38 1994	Mechanical power transmission
0009	1	TJ 1045.P34 1980	Mechanical power transmission
0010	1	TJ 1045.P6	Power transmission & bearing
0011	1	TJ 1045.P68 1979	Power trains.
0012	1	TJ 1051.S75 1987	application of variable speed

0013	1	TJ 1061.D44 1971	Bearings and seals.
0014	1	TJ 1071.B73 1976	Bearing design & fitting /
0015	1	TJ 1071.M6 1965	Anti-friction bearings.
0016	1	TJ 1075.A2L8	Lubrication.
0017	1	TJ 1075.A2S66 1972	Assessment of lubricant techn
0018	1	TJ 1075.B27	lubrication engineers manual,
0019	1	TJ 1075.B63	Boundary lubrication; an appr
0020	1	TJ 1075.B638	Friction; an introduction to

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE------------
0001	1	TJ 1075.B72	Effective lubrication; manage
0002	1	TJ 1075.C26	Basic lubrication theory,
0003	1	TJ 1075.C28 1966A	principles of lubrication
0004	1	TJ 1075.G85 1971	Lubrication
0005	1	TJ 1075.H75 1992	Tribology : friction and wear
0006	1	TJ 1075.M535 1993	Lubricants and their applicat
0007	1	TJ 1075.P6	Wear and lubrication of pisto
0008	1	TJ 1075.S8	Standard handbook of lubricat
0009	1	TJ 1075.T623	Theory of lubrication, with a
0010	1	TJ 1075.Z8 1959	performance of lubricating oi
0011	1	TJ 1077.B678 1971	Gear and transmission lubrica
0012	1	TJ 1077.B7315	Properties of lubricating oil
0013	1	TJ 1077.B735 1964	Solid lubricants and surfaces
0014	1	TJ 1077.E5 1973	EMA lubricating oils data boo
0015	1	TJ 1077.G8	Synthetic lubricants.
0016	1	TJ 1077.O4	Lubricants, cutting fluids, a
0017	1	TJ 1077.S58	Lubricant additives,
0018	1	TJ 1078.C55	Solid lubricants and self-lub
0019	1	TJ 1100.D44	Belts and chains.
0020	1	TJ 1125.A460 1975	Shop planning : basic design

CATALOG-FSU=>bf

NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE------------
0001	1	TJ 1125.A52 1959	Tool engineers handbook: a re
0002	1	TJ 1125.S75 1981	Opportunities in machine shop
0003	1	TJ 1135.C64 1959	Running a machine shop /
0004	1	TJ 1135.P443	Flowline group production pla
0005	1	TJ 1135.R78	Tool engineering.
0006	1	TJ 1160.A65 1959	General shop work,
0007	1	TJ 1160.B228 1987	Modern machining technology /
0008	1	TJ 1160.B53 1970	Machinists library: basic mac
0009	1	TJ 1160.B876	Machine tool operation,
0010	1	TJ 1160.B8762	Machine tool operation
0011	1	TJ 1160.C63 1948	Running a machine shop,
0012	1	TJ 1160.C8 1967	Increased production, reduced
0013	1	TJ 1160.F4 1962	Machine-shop technology.
0014	1	TJ 1160.H365 1968	Elements of workshop technolo
0015	1	TJ 1160.H45 1955	Shop theory.
0016	1	TJ 1160.I8913	Group production organization
0017	1	TJ 1160.J569 1979	General industrial machine sh
0018	1	TJ 1160.J57 1964	Machine shop training course,
0019	1	TJ 1160.K44	Pre-service course in shop pr
0020	1	TJ 1160.K676	Machine shop training

Mechanical Engineering Technology

Response to Accreditation Visitation Report 1996-1997

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1160.K676 1977	Machine shop training /
0002	1	TJ 1160.K678	Modern shop procedures
0003	1	TJ 1160.L8 1975	Metalwork, technology and pra
0004	1	TJ 1160.M225	Metal spinning; applications
0005	1	TJ 1160.M26 1968	Machine tool technology
0006	1	TJ 1160.M66	Machine shop practice.
0007	1	TJ 1160.P373	Machine tool operations
0008	1	TJ 1160.R39 1984	Machine tool technology /
0009	1	TJ 1160.S54 1949	Machining of metal.
0010	1	TJ 1160.T49	Metalwork technology,
0011	1	TJ 1160.V5	Metal machining and forming t
0012	1	TJ 1160.W25 1977	Machining fundamentals : fund
0013	1	TJ 1165.C68 1981	catalog of performance object
0014	1	TJ 1165.L4	new American machinist's hand
0015	1	TJ 1165.L43	Machinist : basic skill devel
0016	1	TJ 1165.M17 1978	Mathematics of the shop /
0017	1	TJ 1165.O44 1982	Operations manual for machine
0018	1	TJ 1165.P68	Mathematical tools for machin
0019	1	TJ 1165.S713	Mathematics for machine techn
0020	1	TJ 1165.V4 1969	use of the mechanics' handboo

CATALOG-FSU=>bf

NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1166.C6	Gages and their use in inspec
0002	1	TJ 1166.R66 1970	Functional gaging
0003	1	TJ 1167.M67	Foundations of mechanical acc
0004	2	TJ 1180.A1A6	
			Manufacturing engineering
			Manufacturing engineering & management
0005	2	TJ 1180.A1P7	
			Automotive production
			Production
0006	1	TJ 1180.A1T6	Tooling & production.
0007	1	TJ 1180.I57 1976	Proceedings of the Seventeent
0008	1	TJ 1180.M32	Machine and tool blue book.
0009	1	TJ 1180.S59	museum of early American tool
0010	1	TJ 1180.U5 1945	Use of tools. Prepared by Sta
0011	1	TJ 1185.A664	machining of metals
0012	1	TJ 1185.B7713	Fundamentals of metal machini
0013	1	TJ 1185.C372 1983	Catalog of performance object
0014	1	TJ 1185.C653	Tool design; fundamental prin
0015	1	TJ 1185.C85 1986	Tool design for manufacturing
0016	1	TJ 1185.D55 1973	Tool design,
0017	1	TJ 1185.D63	Tool engineering; analysis an
0018	1	TJ 1185.E45	Elsevier's dictionary of meta
0019	1	TJ 1185.F4 1973	Machine tool metalworking: pr
0020	1	TJ 1185.F456 1984	Exploring careers in the tool

CATALOG-FSU=>bf

NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1185.F875 1984	Fundamentals of tool design /
0002	1	TJ 1185.F875 1991	Fundamentals of tool design /
0003	1	TJ 1185.H374	Machine tools : processes and
0004	1	TJ 1185.H5 1971	Machine tools and processes f
0005	1	TJ 1185.H68 1968	Tool & die drafting; a basic
0006	1	TJ 1185.I575	Advances in machine tool desi
0007	1	TJ 1185.J64 1971	Design of machine tools,
0008	1	TJ 1185.J66 1955	Jig and fixture design; a tre
0009	1	TJ 1185.K458 1982	Machine tool practices /
0010	1	TJ 1185.K5886	Machine tool structures
0011	1	TJ 1185.K668 1977	Technology of machine tools /
0012	1	TJ 1185.L523 1969B	Transfer and unit machines,
0013	1	TJ 1185.M2 1980	Machining data handbook.
0014	1	TJ 1185.M224	Machine tools and machining p
0015	1	TJ 1185.M224 1987	Machine tool practices /
0016	1	TJ 1185.M234 1980	Machining data handbook /
0017	1	TJ 1185.P653	Machine tool maintenance and
0018	1	TJ 1185.R63	short history of machine tool
0019	1	TJ 1185.S353 1978	Testing machine tools : for t
0020	1	TJ 1185.S5489 1972	dictionary of machining

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1185.S884	Swarf and machine tools: a gu
0002	1	TJ 1185.W35 1994	McGraw-Hill machining and met
0003	1	TJ 1185.W386	Machine-tool dynamics; an int
0004	1	TJ 1185.W698	Studies in the history of mac
0005	1	TJ 1185.Z613 1966	Metal cutting mechanics,
0006	1	TJ 1186.A47	Machining of high strength st
0007	1	TJ 1186.A614	Producibility/machinability o
0008	1	TJ 1186.B5	Design of cutting tools; use
0009	1	TJ 1186.C6	Research in support of numeri
0010	1	TJ 1186.C8	Cutting tool material selecti
0011	1	TJ 1186.K48	Ceramics in machining process
0012	1	TJ 1186.P58	Tool design /
0013	1	TJ 1186.T57 1982	Tool and die failures /
0014	1	TJ 1187.A6 1962	Handbook of fixture design; a
0015	1	TJ 1187.B62 1968	Elementary jig and fixture de
0016	1	TJ 1187.C6	Jigs and fixtures; a referenc
0017	1	TJ 1187.G7	Jigs and fixtures; non-standa
0018	1	TJ 1187.H36 1989	Handbook of jig and fixture d
0019	1	TJ 1187.H46	Jig and fixture design manual
0020	1	TJ 1187.H63 1980B	Jig and fixture design /

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1187.J52 1982	Jigs and fixtures /
0002	1	TJ 1187.J65 1972	Production engineering: jig a
0003	1	TJ 1187.K4 1969	Principles of jig and tool de
0004	1	TJ 1187.W47 1979	catalog of performance object
0005	1	TJ 1187.W67 1982	Workholding.
0006	1	TJ 1188.K513 1965	Hydraulic control of machine

0007	1	TJ 1189.A58	Introduction to numerical con
0008	1	TJ 1189.A6	Numerical control in manufact
0009	1	TJ 1189.A62	Numerical control, its applic
0010	1	TJ 1189.B26	Numerical control for machine
0011	1	TJ 1189.C21 1984	COMPACT II programming manual
0012	1	TJ 1189.C468	Numerical control part progra
0013	1	TJ 1189.C47 1969	Principles of numerical contr
0014	1	TJ 1189.C47 1982	Principles of numerical contr
0015	1	TJ 1189.E7	Numerical control
0016	1	TJ 1189.H34	Retrofitting machine tools; c
0017	1	TJ 1189.L45	Production automation and num
0018	1	TJ 1189.L6	Fundamentals of numerical con
0019	1	TJ 1189.L84 1984	Fundamentals of numerical con
0020	1	TJ 1189.L84 1988	Fundamentals of numerical con

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1189.M28	Management guide to NC.
0002	1	TJ 1189.M58	Numerically controlled machin
0003	1	TJ 1189.N23	N/C machinability data system
0004	1	TJ 1189.N796	Numerical control for tomorro
0005	1	TJ 1189.N7966	expanding world of NC; procee
0006	1	TJ 1189.N7978	NC/CAM profits for the 70's; p
0007	1	TJ 1189.N798	NC: management's key to the s
0008	1	TJ 1189.N7981	NC: 1971, the opening door to
0009	1	TJ 1189.N82	Numerical control today.
0010	1	TJ 1189.N83	Numerical control users' hand
0011	1	TJ 1189.N85 1960	Numerical control for metalwo
0012	1	TJ 1189.O4	Numerical control,
0013	1	TJ 1189.P36	Numerical control: practice a
0014	1	TJ 1189.R6 1978	Programming for numerical con
0015	1	TJ 1189.S6	Management standards for comp
0016	1	TJ 1189.S60	Manufacturing with numerical
0017	1	TJ 1189.T45	Engineering graphics and nume
0018	1	TJ 1191.D4 1968	Electrochemical machining,
0019	1	TJ 1191.M24	Principles of electrochemical
0020	1	TJ 1191.M2813	Ultrasonic machining of intra

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1191.W55	Practice and theory of electr
0002	1	TJ 1193.B8	Progress in industrial diamon
0003	1	TJ 1193.I525 1967AA	industrial diamond revolution
0004	1	TJ 1193.I56 1969	Proceedings : International I
0005	1	TJ 1194.B45	Plastic tooling; techniques a
0006	1	TJ 1195.C3	Power handtool handbook /
0007	1	TJ 1195.D35	Outdoor power equipment : how
0008	1	TJ 1195.D36 1975	Country tools : essential har
0009	1	TJ 1195.D64	Everyone's book of hand and s
0010	1	TJ 1195.G669 1984	Tab handbook of hand and powe
0011	1	TJ 1195.H361	Hand tools for metalworking t
0012	1	TJ 1195.H86	With hammer in hand; the Domi
0013	1	TJ 1195.J6	Popular tools and materials,
0014	1	TJ 1195.M69 1955B	How to use tools.

0015	1	TJ 1195.W356 1982	Hand tools : their ways and w
0016	1	TJ 1195.W49	making of tools
0017	1	TJ 1195.W53	Basic automotive tools.
0018	1	TJ 1201.A9K38	American axes; a survey of th
0019	1	TJ 1201.C5W375 1976	Machine shop skill manual : p
0020	1	TJ 1201.P55G6 1969	British plane makers from 170

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1201.P55S44	Stanley plane : a history and
0002	1	TJ 1201.V5W375 1976	Machine shop skill manual : d
0003	1	TJ 1215.C6 1948	Turning and boring practice,
0004	1	TJ 1215.C65	COMPACT II basic turning text
0005	1	TJ 1215.T87 1985	Turning and boring : angles a
0006	1	TJ 1218.W72 1964	History of the lathe to 1850
0007	1	TJ 1222.B76 1978	Brown & Sharpe automatic scre
0008	1	TJ 1222.W375 1976	Machine shop skill manual : t
0009	1	TJ 1225.C582 1951	treatise on milling and milli
0010	1	TJ 1225.C65	COMPACT II basic milling/dril
0011	1	TJ 1225.M4x	Milling cutters and end mills
0012	1	TJ 1230.A49	Premachining planning and too
0013	1	TJ 1230.S53 1957	Metal cutting principles.
0014	1	TJ 1233.C53 1974	Chain saw service manual.
0015	1	TJ 1233.V36 1992	development of a product desi
0016	1	TJ 1255.S7 1950	Punches and dies;
0017	1	TJ 1260.A518 1967	Gundrilling, trepanning, and
0018	1	TJ 1280.B72 1980x	Sharpening small tools /
0019	1	TJ 1280.F3	Abrasive methods engineering
0020	1	TJ 1280.F3 1976B	Abrasive methods engineering

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE-----------
0001	1	TJ 1280.G33 1983	How to sharpen anything /
0002	1	TJ 1280.G54	Deburring capabilities and li
0003	1	TJ 1280.I65 1972	New developments in grinding;
0004	1	TJ 1280.L6 1973	Techniques of barrel and vibr
0005	1	TJ 1280.W3	Home and workshop guide to sh
0006	1	TJ 1293.A43 1975	American National Standard sa
0007	1	TJ 1296.C6 1965	Coated abrasives: modern tool
0008	1	TJ 1296.K73 1990	Superabrasives : grinding and
0009	1	TJ 1296.P5 1975	abrasive ages : a history of
0010	1	TJ 1300.M47 1974	Press brake and shear handboo
0011	1	TJ 1305.K47 1992	little giant powerhammer : re
0012	1	TJ 1313.D64	Measurement systems: applicat
0013	1	TJ 1313.I58 1952	Precision measurement in the
0014	1	TJ 1317.R54 1983	Assembly automation : a manag
0015	1	TJ 1320.B37 1973	Basic fastening and joining t
0016	1	TJ 1320.E9	staple gun in home & industry
0017	1	TJ 1320.F3 1974	Fasteners.
0018	1	TJ 1320.H5	Assembly engineering master c
0019	1	TJ 1320.I38 1965	Fastener standards.
0020	1	TJ 1320.I38 1970	Fastener standards /

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE------------
0001	1	TJ 1320.L3	Handbook of fastening and joi
0002	1	TJ 1320.S74	Standard handbook of fastenin
0003	1	TJ 1320.S74 1989	Standard handbook of fastenin
0004	1	TJ 1320.S74 1997	Standard handbook of fastenin
0005	1	TJ 1340.M3 1969	Machinery's screw thread book
0006	1	TJ 1340.S37 1968	Screw thread.
0007	1	TJ 1363.A43 1943	Safety code for cranes, derri
0008	1	TJ 1363.K619 1976	Crane design : theory and cal
0009	1	TJ 1367.R6 1964	Handbook of rigging, for cons
0010	1	TJ 1370.A64 1979	American national standard pr
0011	1	TJ 1372.A43 1978	American National Standard Sa
0012	1	TJ 1390.C65 1979	Belt conveyors for bulk mater
0013	1	TJ 1450.B58	Bliss power press handbook.
0014	1	TJ 1450.M48 1969	Mechanical press handbook.
0015	1	TJ 1450.N27 1979	Power press safety manual.
0016	1	TJ 1450.U52	Understanding presses and pre
0017	1	TJ 1460.A45 1980	Specification for welding of
0018	1	TJ 1460.M8233	Hydraulic forging presses.
0019	1	TJ 1487.D45	complete handbook of lawnmowe
0020	1	TJ 1495.U6W5	Steam power on the American f

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NMBR	COUNT	(CA)---------INDEX KEY-----------	------------TITLE------------
0001	1	TJ 1496.D43	story of John Deere : a saga
0002	1	TJ 1507.E9	Sincere's history of the sewi
0003	1	TJ 1513.E9 1971	Sincere's sewing machine serv
0004	1	TJ 1513.E93	Sincere's zig zag sewing mach
0005	1	TJ 1560.C64 1977	great vending machine book /
0006	1	TJ 1560.T68	Vending machines in schools a

To : George Olsson
From : Ray Dickinson, COT Library liaison
Subject : Library books in selected TA classifications
Date : March 13, 1997

Attached to this memo is the list of all books classified in the selected Library of Congress classification schedule for TA. There are 634 books in this list. Combining this list with the one for the TJ's, which had 903 books, brings the total for both class numbers to 1,537.

0002*	1	TA 9.A63 1973	Glossary of ASTM definitions,
0003	1	TA 9.J65 1963	Engineering encyclopedia; a c
0004	1	TA 9.S35 1965	dictionary of civil engineeri
0005	1	TA 9.W43 1995	Contractors' dictionary of eq
0006	1	TA 11.A53	Abbreviations for use on draw
0007	1	TA 11.A7	Standard graphical symbols; a
0008	1	TA 11.E5	Encyclopedia of engineering s
0009	1	TA 12.A4	ACEC directory.
0010	1	TA 12.D488	Directory of expert witnesses
0011	1	TA 12.E3	ENR directory of contractors.
0012	1	TA 12.P76	Professional engineering dire
0013	1	TA 15.A7	social history of engineering
0014	1	TA 15.B53 1996	innovators : the engineering
0015	1	TA 15.K5	Engineering in history
0016	1	TA 15.P35 1965	illustrated history of civil
0017	1	TA 15.R35	Engineering;
0018	1	TA 15.S26	Man, the builder
0019	1	TA 15.S813 1964	history of civil engineering;
0020	1	TA 15.U67 1976	illustrated history of civil
0001	1	TA 16.G53 1963	Engineering.
0002	1	TA 16.M33	City; a story of Roman planni
0003	1	TA 18.G5413 1966	Engineers of the Renaissance.
0004	1	TA 18.P3 1968	Engineers and engineering in
0005	1	TA 19.B7	elegant solution.
0006	1	TA 19.C87 1988	History of the National Counc
0007	1	TA 19.S84 1976	Towers, bridges, and other st
0003	1	TA 151.C2 1973	CRC handbook of tables for ap
0004	1	TA 151.D56 1993	Land development for civil en
0005	1	TA 151.E424 1996	engineering handbook /
0006	1	TA 151.E8 1974	Handbook of engineering funda
0007	1	TA 151.H425 1994	Wiley project engineer's desk
0008	1	TA 151.H44	Engineers' illustrated thesau
0009	1	TA 151.H52	Standard handbook of engineer
0010	1	TA 151.I2313	Handbook for engineers,
0011	1	TA 151.L47	engineer's handbook illustrat
0012	1	TA 151.L56 1986	Engineering fundamentals quic
0013	1	TA 151.M15	Engineering and technical han
0014	1	TA 151.M34 1991	McGraw-Hill handbook of essen
0015	1	TA 151.S8 1983	Standard handbook for civil e
0016	1	TA 151.Z49	Handbook of environmental civ
0017	1	TA 152.H6 1994	Experimental methods for engi

0011	1	TA 157.B39 1984	Careers in engineering and te
0012	1	TA 157.B394 1986	Engineering : an introduction
0013	1	TA 157.C25	Labor market analysis of engi
0014	1	TA 157.C26	Business, legal and ethical p
0015	1	TA 157.C26 1954	Business, legal, and ethical
0016	1	TA 157.C29 1971	Changing careers in science a
0017	1	TA 157.C53	engineer's guide to employmen
0018	1	TA 157.D25	Characteristics of engineers
0019	1	TA 157.E662	Engineering and technology de
0020	1	TA 157.E7	role of contract engineering
0001	1	TA 157.F64	shortage of scientists and en
0002	1	TA 157.G327 1996	Great jobs for engineering ma
0003	1	TA 157.G9	international consultant /
0004	1	TA 157.H5	Professional achievement for
0005	1	TA 157.H54	Engineer; ingenious contriver
0006	1	TA 157.K4	engineer and his profession.
0007	1	TA 157.L38	revolt of the engineers; soci
0008	1	TA 157.P38	engineers and the social syst
0009	3	TA 157.P44	Engineering, science, and computer jobs Peterson's guide to engineering, science, and computer jobs Peterson's annual guide to careers and employment for engineers, computer scientists, and physical scientists
0010	3	TA 157.P48	Peterson's job opportunities in engineering and technology Peterson's job opportunities for engineering science, and computer graduates
0011	1	TA 157.P66 1996	Introduction to engineering t
0012	1	TA 157.P67 1981	Women in engineering /
0013	1	TA 157.R458	Engineering careers with cons
0014	1	TA 157.R48 1985	engineering/high-tech student
0015	1	TA 157.R52	Administration of salaries an
0016	1	TA 157.R53	Collective bargaining as view
0017	1	TA 157.R58	engineer in the industrial co
0018	1	TA 157.R6	Excellence in engineering
0019	1	TA 157.S24 1971	Salaries of scientists, engin
0020	1	TA 157.S6 1962	Engineering as a career.
0001	1	TA 157.T67	Optimum utilization of scient
0002	1	TA 157.Y58	Technicians today and tomorro
0003	1	TA 158.A53	Matching technicians to jobs,
0004	1	TA 158.B79	Technician training. How to d
0005	1	TA 158.F47	Michigan technician need stud
0006	1	TA 158.I57	Instrument and control techni
0007	1	TA 158.N46	Technical manpower in New Yor
0008	1	TA 158.R48	technical manpower shortage:
0009	1	TA 158.W45 1994	technical career navigator /
1			
0016	2	TA 165.A14	InTech ISA Journal

0017	6 TA 165.A2	Instrumentation & control systems : I&CS Chilton's I & C S : the industrial and process control magazine Chilton's instruments & control systems Instruments & control systems Instruments and automation Instruments : the magazine of measurement, inspection, testing, control
0018	1 TA 165.A38	Advances in instrumentation :
0019	1 TA 165.B38 1969	Mechanical measurements
0020	1 TA 165.C3	Industrial instrument servici
0001	1 TA 165.C32 1962	Industrial process measuring
0002	1 TA 165.F73	Industrial instrumentation fu
0003	1 TA 165.I622I26 1980	InTech index, 1954-1979.
0004	1 TA 165.K3	Handbook of instrumentation a
0005	1 TA 165.K5	Instrumentation
0006	1 TA 165.K53	Optical tooling for precise m
0007	1 TA 165.M638 1993	Principles of measurement and
0008	1 TA 165.N27	Instrument maintenance manage
0009	1 TA 165.O35	Basic instrumentation; indust
0010	1 TA 165.P33 1992	Electronic instruments : inst
0011	1 TA 165.P34 1979	Instrumentation training cour
0012	1 TA 165.S447 1994	Semiconductor sensors /
0013	1 TA 165.S725	Instrumentation in industry /
0014	1 TA 165.T52	Telephone directory /
0001	1 TA 167.I57 1976	Monitoring behavior and super
0002	1 TA 167.K4 1968	Manual and automatic control;
0007	1 TA 174.B6	Engineering design computatio
0008	1 TA 174.B74 1970	From project to production,
0009	1 TA 174.C46	Changing design /
0010	1 TA 174.D485 1993	Design to reduce technical ri
0011	1 TA 174.D5	Design engineering; inventive
0012	1 TA 174.E23 1994	Engineering design graphics :
0013	1 TA 174.F67 1988	Using AutoCAD /
0014	1 TA 174.F75 1988	Invention and evolution : des
0015	1 TA 174.G48	Introduction to engineering d
0016	1 TA 174.G55	design of design
0017	1 TA 174.G556	science of design
0018	1 TA 174.G56	selection of design
0019	1 TA 174.H3	Engineersmanship; a philosoph
0020	1 TA 174.H53	science of engineering design
0001	1 TA 174.I5	Introduction to creative desi
0002	1 TA 174.I56 1986	International computer-aided
0003	1 TA 174.J332 1996	Stereolithography and other R
0004	1 TA 174.J67	Design methods: seeds of huma
0005	1 TA 174.J676 1988	Engineering design : reliabil
0006	1 TA 174.K375 1995	AutoCAD for mechanical engine
0007	1 TA 174.M53	Engineering design
0008	1 TA 174.M58 1995	Digital design media /
0009	1 TA 174.P37 1984	New product development in en
0010	1 TA 174.P473 1994	Design paradigms : case histo
0011	1 TA 174.P474 1985	To engineer is human : the ro

0012	1	TA 174.R6 1966	Engineering design; papers gi
0013	1	TA 174.S65 1975	student's introduction to eng
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0019	1	TA 641.W4	Computer programs for structu
0020	1	TA 642.L33 1978	Structural analysis /
0001	1	TA 642.W28	Introductory structural analy
0002	1	TA 643.M6	Models in architecture.
0003	1	TA 645.B36	Basic concepts of structural
0004	1	TA 645.B67 1984	Understanding structural anal
0005	1	TA 645.C66	Analysis of structural member
0006	1	TA 645.G44	Basic structural analysis
0007	1	TA 645.G48 1978	Structural analysis : a unifi
0008	1	TA 645.H36 1977	Basic concepts of structural
0009	1	TA 645.N58 1976	Elementary structural analysi
0010	1	TA 645.W54	Structural analysis for engin
0011	1	TA 646.C64	Computer methods of structura
0012	1	TA 646.R36 1993	Handbook on structural testin
0013	1	TA 646.T85	Schaum's outline of theory an
0014	1	TA 648.S24	Statics and strength of struc
0015	1	TA 652.B28	Plastic design of frames
0016	1	TA 652.B72 1982	Simple methods for identifica
0017	1	TA 652.H67 1971B	Plastic theory of structures
0018	1	TA 654.C6	Dynamics of structures /
0019	1	TA 654.5.I48 1975	Proceedings of the Fourth Int
0020	1	TA 654.5.I52 1967	Wind effects on buildings and
0002	1	TA 655.E74	Prototype structural system i
0003	1	TA 656.C76	Elements of structural stabil
0004	1	TA 656.F35 1995	Failures in civil engineering
0005	1	TA 656.N4513 1990	Endurance of mechanical struc

0006	1	TA 656.5.I56 1969	International Conference on S
0017	1	TA 660.B4H65	Design analysis of shafts and
0018	1	TA 660.D6K46	Geodesic math and how to use
0019	1	TA 660.D6P83 1976	introduction to tensegrity /
0020	1	TA 660.F7S3 1974	Stabilitat ebener Stabwerke n
0001	1	TA 660.J64M47 1993	Joining of advanced materials
0002	1	TA 660.J64S45 1984	Fasten it! /
0003	1	TA 660.P55T56 1993	Pipejacking and microtunnelli
0004	1	TA 660.S5C24 1988	Theory of shell structures /
0005	1	TA 660.S5H48	Equilibrium of shell structur
0006	1	TA 663.R613	Frei Otto: tension structures
0007	1	TA 664.C3	analysis of laminated composi
0008	1	TA 664.C65	Composite construction method
0009	1	TA 666.A5 1974	Timber construction manual; a
0010	1	TA 666.G87 1981	Wood engineering /
0011	1	TA 666.H34 1994	Principles of timber design f
0012	1	TA 666.H66 1978	Wood technology in the design
0013	1	TA 666.J2 1930	Timber design and constructio
0014	1	TA 666.T47 1986	Timber construction manual /
0015	1	TA 666.T5	Timber design and constructio
0016	1	TA 666.W37 1973	Western woods use book; struc
0017	1	TA 666.W63 1989	Wood engineering and construc
0018	1	TA 666.W63 1995	Wood engineering and construc
0019	1	TA 666.W65	Wood structures : a design gu
0010	1	TA 684.A47 1948	Steel construction, a manual
0011	1	TA 684.A47 1970	Manual of steel construction.
0012	1	TA 684.A47 1980	Manual of steel construction.
0013	1	TA 684.B54	Design of welded structures,
0014	1	TA 684.D58	Applied plastic design in ste
0015	1	TA 684.E66 1994	Steel structures : controllin
0016	1	TA 684.F3 1966	Constructional steelwork simp
0017	1	TA 684.G3 1972	Design of steel structures
0018	1	TA 684.H82	Elementary steel structures.
0019	1	TA 684.J25	Modern welded structures /
0020	1	TA 684.J6	Basic steel design
0001	1	TA 684.L558 1986	Load & resistance factor desi
0002	1	TA 684.L6 1965	Design in structural steel
0003	1	TA 684.L6 1972	Design in structural steel
0004	1	TA 684.M25 1971	Structural steel design
0005	1	TA 684.M35	Basics of structural steel de
0006	1	TA 684.P33 1974	Simplified design of structur
0007	1	TA 684.S656 1986	Applied structural steel desi
0008	1	TA 684.Z39 1995	Steel detailing in CAD format
0009	1	TA 685.S77 1973	Structural steel data for arc
0010	1	TA 690.S44 1993	Behavior and design of alumin

To : George Olsson
From : Ray Dickinson, COT Library liaison
Subject : Patent materials
Date : March 11, 1997

The Timme Library, Ferris State University was designated an official Patent and Trademark Depository Library in August 1991, by the United States Patent and Trademark Office (USPTO). Since that time, the library has been receiving all of the materials that have been issued by the USPTO, including full patents. One of the Timme librarians has been trained by the USPTO to provide training in the use of the patent and trademark searching databases.

The Timme Library has 780,556 full patents housed within the building. They are either on CD-ROM (1994-) or on 16mm film (1986-1987; 1991-). Also available in the Timme Library are almost 4,000,000 Unexamined Japanese patent applications on CD-ROM.

Via the Internet, IBM is providing free access to all patents since 1980. This site provides free downloading (printing) of any of the 1,425,876 patents in its database. Also, IBM is continually adding more patents to its database. Finally, there are about 300,000 (1986-1997) Canadian patents accessible via the Internet.

Journals held by the Timme Library with Library of Congress call numbers beginning with TJ

NMBR DATE --------------------TITLE------------------- -------AUTHOR-------
0001 1988- American machinist.
0002 1986- American machinist & automated manufacturing
0003 1980- Energy engineering : journal of the Associati
0004 1970- SAE journal of automotive engineering. Society of Automotiv
0005 1968- American machinist.
0006 1960- American machinist, metalworking manufacturin
0007 1950- Power engineering.
0008 1948- Power generation.
0009 1930- Product engineering.
0010 1928- The SAE journal.
0011 1919- Mechanical engineering.
0012 1911- Power.
0013 1902- Machinery.

Journals held by the Timme Library with Library of Congress call numbers beginning with TA

NMBR DATE --------------------TITLE------------------- -------AUTHOR-------
0001 1996- Automotive production.
0002 1994- Software quarterly : SQ : IBM's magazine of s
0003 1993- AS/400.
0004 1993- Construction products.
0005 1993- MANPRINT quarterly. United States. Dept.
0006 1992- Beyond computing.
0007 1992- Highway & heavy construction products.
0008 1992- Penton's controls & systems.
0009 1992- The APPC connection.
0010 1990- Personal systems : IBM personal systems techn
0011 1990- Refrigeration service & contracting.
0012 1988- American machinist.
0013 1987- Package printing and converting.
0014 1986- American machinist & automated manufacturing
0015 1986- Tech notes.
0016 1984- Office systems : the magazine for small and m
0017 1983- World mining equipment.
0018 1981- Contracting business.
0019 1980- InfoWorld.
0020 1979- Specifications, tolerances, and other technic National Conference
0021 1978- Database.
0022 1976- Highway & heavy construction.
0023 1972- Infosystems.
0024 1969- Data base.
0025 1968- American machinist.
0026 1966- RSC. Refrigeration service and contracting.
0027 1962- IBM systems journal.
0028 1961- Business automation.
0029 1960- American machinist, metalworking manufacturin
0030 1960- Tooling & production.

0031 1959- ASHRAE journal.
0032 1959- Communications of the ACM.
0033 1959- Management and business automation.
0034 1959- Punched card data processing
0035 1958- Air conditioning, heating & refrigeration new
0036 1958- Machine accounting and data processing
0037 1958- The Refrigeration & air-conditioning business
0038 1957- IBM journal of research and development.
0039 1953- Production.
0040 1952- Quick frozen foods.
0041 1952- Refrigeration service and contracting.
0042 1949- Commercial refrigeration & air conditioning.
0043 1948- Industrial distribution.
0044 1947- Machine and tool blue book.
0045 1936- Air conditioning and refrigeration news.
0046 1933- The Refrigeration service engineer.
0047 1930- Steel.
0048 1929- Machine design.
0049 1928- Modern machine shop.
0050 1911- Power.
0051 1902- Machinery.
0052 1902- Successful farming.
0053 19uu- Current industrial reports. Construction mach
0054 19uu- Implement & tractor.
0055 19uu- Plastics machinery & equipment.

Journals held by the Timme Library in the Library of Congress Classification TA

0001 1996- Automotive production.
0002 1996- Truck fleet management.
0003 1992- Penton's controls & systems.
0004 1988- American machinist.
0005 1988- Diesel progress engines & drives.
0006 1987- Automation.
0007 1986- American machinist & automated manufacturing
0008 1984- DES.
0009 1982- Solar engineering & contracting.
0010 1981- Diesel progress North American.
0011 1981- Modern power systems.
0012 1980- Diesel equipment superintendent : DES.
0013 1980- Energy engineering : journal of the Associati
0014 1979- DES.
0015 1977- Production engineering.
0016 1976- Solar engineering magazine.
0017 1975- Energy.
0018 1975- Manufacturing engineering.
0019 1975- Solar energy intelligence report.
0020 1974- Computers and people.
0021 1970- Manufacturing engineering & management.
0022 1968- American machinist.
0023 1961- Diesel equipment superintendent.
0024 1961- Equipment superintendent
0025 1960- American machinist, metalworking manufacturin
0026 1960- Tooling & production.
0027 1954- Automation.
0028 1954- Control engineering.
0029 1954- Diesel power
0030 1953- Production.
0031 1950- Power engineering.
0032 1948- Power generation.
0033 1947- Machine and tool blue book.
0034 1929- Machine design.
0035 1928- Modern machine shop.
0036 1919- Mechanical engineering.
0037 1911- Lubrication.
0038 1911- Power.
0039 1902- Machinery.
0040 19uu- Diesel power and diesel transportation.

0001 1995- The Trans Tasman surveyor
0002 1993- CD-ROM today.
0003 1993- Geomatica.
0004 1992- Instrumentation & control systems : I&CS.
0005 1990- Aberdeen's concrete construction.
0006 1990- Surveying and land information systems : jour
0007 1988- CISM journal = Journal ACSGC.
0008 1987- Consulting-specifying engineer.
0009 1987- ENR.
0010 1985- Advanced materials & processes.

0011 1983- Chilton's I & C S : the industrial and proces
0012 1983- Civil engineering.
0013 1983- Journal of transportation engineering /
0014 1983- Journal of surveying engineering.
0015 1983- Journal of construction engineering and manag
0016 1981- Professional surveyor.
0017 1980 InTech index, 1954-1979. Icon/Information Con
0018 1980- Polymer composites.
0019 1979- InTech.
0020 1977- Chilton's instruments & control systems.

0001 1992- Instrumentation & control systems : I&CS.
0002 1983- Chilton's I & C S : the industrial and proces
0003 1980 InTech index, 1954-1979. Icon/Information Con
0004 1979- InTech.
0005 1977- Chilton's instruments & control systems.
0006 1959- Instruments & control systems.
0007 1954- Instruments and automation.
0008 1954- ISA journal. Instrument Society o
0009 1932- Instruments : the magazine of measurement, in

Index Location Guide

TITLE	LOCATION
Academic Index, Expanded	LAN
Accountant's Index (1948-91)	G
America: History and Life	A
American Heritage Cumulative Index	A
American Periodicals 1741-1900	A
American Statistics Index (ASI)	E
Applied Science & Technology Index (1958-)	J, LAN
Architectural Index (1964-91)	H
Art Index (1957-)	H
Automotive Literature Index (1947-86)	J
Bibliographic Index (1975-82)	I
Biography Index	A
Biological and Agricultural Index (1951-)	J
Book Review Index (1965-)	H
British Humanities (1988-)	H
British Technology Index (1976-79)	J
Business Education Index (1955-)	D
Business Index	LAN
Business Newsbank (1987-94)	B, LAN
Business Periodicals Index (1958-)	G
Chemical Abstracts	3rd Floor
Children's Book Review Index (1979-)	H
Christian Science Monitor, Index to (1960-)	B
CINAHL	HSL
CINAHL	LAN
Computer Literature Index	G
Computing Literature, ACM Guide to (1979,80,82)	G
Computerworld Index	G
Computing Reviews (1972-81)	G
Consumer's Index	A
Corporate and Industry Research Report(CIRR)(1989-91)	G
Criminal Justice Abstracts	F
Criminal Justice Periodical Index	F
Criminal Justice Reference Service	LAN
Current Index to Journals in Ed. (CIJE) (1973-)	sw
Current Law Index (1980-)	F
Current Technology Index (1982,84,88)	J
Datapro Master Index (1992)	G
Dental Abstracts	HSL
Dental Literature, Index to	HSL
Detroit News Index (1976-)	G
Dissertation Abstracts	Stack 9
Education Index (1929-)	D
Energy Index (1975-86)	J
Environment Index Abstracts (1980-86)	J
ERIC	LAN
Essay and General Literature Index (1900-)	I
Ethnic Newswatch	LAN
Fed in Print	G
Federal Index, The (1977-1985)	F
General Periodicals Index	LAN
General Science Index	J, LAN
Grand Rapids Press Index (1986-)	B
Graphic Arts Literature Abstracts (1973-88)	J
Graphic Arts Progress (1970-72)	J
Health Reference Center	LAN
Hospital Literature Index	HSL
Hotel&Restaurant Administration Bibliography(1975-85)	G
How to do it Information, Index to (1963-89)	J
Humanities Index (1974-)	H
Index Medicus, Cumulated	HSL
Index to International Statistics (IIS)	E
Industrial Arts Index (1944-57)	C
Insurance Periodicals Index (1977-94)	G
International Nursing Index	HSL
International Pharmaceutical Abstracts	LAN
Kirkus Reviews (1976-)	I
Law Office Information Service	F
Legal Periodicals, Index to (1970-81)	F
Library Literature (1955-)	I
Lodging and Restaurant Index	G
Medline	LAN
Michigan History Index (1917-73)	A
Michigan Magazine Index (1965-88)	A
Michigan Magazine Index (1967-87)	fiche cab.
Michigan Newspaper Index	B
Microcomputer Index	G
MLA Directory of Periodicals	I
MLA International Bibliography (1969-80)	I
Names in the News Index (1984-)	B
National C.J. Ref. Sues. Fiche	F
National Geographic Index	A
National Newspaper Index	LAN
New York Times Biographical Service (1973-)	A
New York Times Book Review Index (1896-70)	H
New York Times Index (1899-1938)	desk
New York Times Index (1939-)	B
Newsbank (1971-94)	B
Newsbank Reference Service	LAN
Nursing and Allied Health Literature, Cumulative Index to (see CINAHL)	
Nursing Literature, Cumulative Index to	HSL
PAIS Bulletin (1947-)	F
Personnel Management Abstracts	G
Physical Education/Sport Index	D
Psychological Abstracts (1973-76,78-)	D
Reader's Guide to Periodical Literature (1890-)	A
Resources in Education (RIE) (1965-)	sw
Resources in Vocational Education (1977-1983)	D
Saturday Review of Literature Index (1924-44)	I
Science Citation Index (1988-89)	J
Short Story Index (1950-)	I
Social Sciences and Humanities Index (1949-74)	H
Social Sciences Index (1974-)	H, LAN
~~Social Sciences Citation Index (SSCI) (1978-91)~~	~~H~~
Social Work Research & Abstracts	H
Statistical Masterfile	LAN
Statistical Reference Index (SRI)	E
Topical Index of N.A.A. Publications	G
Topicator	G
Vision Index	HSL
Wall Street Journal Index (1955-)	C

A-M = low bookcases
sw = south wall
HSL = Health Science Library
LAN = Local Area Network

1-97

Michigan Statewide FirstSearch Program

February 1997

The following FirstSearch databases are for unlimited access to the Michigan academic, public, and K - 12 libraries.

* *List of bibliographic databases*

WorldCat
ArticleFirst
ContentsFirst
NetFirst
FastDoc
PapersFirst
ProceedingsFirst
AGRICOLA
AIDS & Cancer Research
Applied Science & Technology
Art Abstracts
Arts & Humanities Search
Biography Index
Biological & Agricultural Index
Biology Digest
Book Review Digest
Books in Print
Business and Industry Database *(full text)*
BusinessNews
Business Organizations
CINAHL
Consumers Index
DataTimes
Disclosure Corporate Snapshots
Dissertation Abstracts
EconLit
Education Index
Environmental Sciences & Pollution Management
ERIC
EventLine
FactSearch
General Science Abstracts
GEOBASE
GeoRef
GPO Monthly Catalog
Humanities Abstracts
Index to Legal Periodicals & Books
INSPEC
Library Literature
MDX Health Digest
MEDLINE
Microcomputer Abstracts
New York Times Database *(full text)*
Newspaper Abstracts
Periodical Abstracts *(full text)* ✓
PAIS Decade
Pro CD Biz
Pro CD Home
PsycFIRST
Readers' Guide Abstracts
RILM
Social Sciences Abstracts
SocioAbs
Wilson Business Abstracts
World Almanac
Worldscope GLOBAL

Eligible databases will be added to or removed from this list according to their availability on FirstSearch.

APPENDIX G

TEXTBOOK ADOPTION FORMS

PROPOSED CHANGES

FERRIS STATE UNIVERSITY

APPLICATION FOR CHANGE OR ADOPTION OF TEXTBOOK

Course number(s) MECH 212

Course title Kinematics of Mechanisms

Title of new textbook desired? Kinematics, A Graphical Approach List price

Author Jerome Lange Publisher Prentice Hall

Date effective Winter 1998 Publisher's address

ISBN# 0-13-125303-4

Book #

Publisher's phone

Approximate number of new textbooks needed each term? 30 Copyright date or edition? 1995

Title of textbook to be discontinued Basic Graphical Kinematics, Kepler & Problems in Basic Graphical Kinematics, Kepler Date adopted

Author Publisher

Requested by George R. Olsson Date 3-13-97

Recommended by Douglas Chase Date 3-13-97
Department Head

To be completed by Bookstore:

Quantity of discontinued texts left over

Estimated loss

Date Signed
Course Book Department

IMPORTANT: Kindly initiate at least one semester prior to the time you plan to use the book.

If this adoption replaces a text, the form entitled "Intent to Discontinue Textbook" should precede it. Processing of the "Intent" is requested within 60 days, if possible, following the beginning of the fall semester in order to permit the Bookstore to dispose of surplus stock.

White — Department Head's Copy
Green — Bookstore's Copy
Canary — File Copy

4/93 Rev.

PROPOSED CHANGES

FERRIS STATE UNIVERSITY

APPLICATION FOR CHANGE OR ADOPTION OF TEXTBOOK

COPY

Course number(s) MECH 222

Course title Principles of Design 2

Title of new textbook desired? Machine Elements in Mechanical Design List price ____

Author Robert L. Mott Publisher MacMillan

Date effective Winter 1998 Publisher's address ____

ISBN# 0-675-22289-3

Book # ____ Publisher's phone ____

Approximate number of new textbooks needed each term? 25 Copyright date or edition? 2nd

Title of textbook to be discontinued Machine Design Fundamentals Date adopted ____

Author Hindhede Publisher ____

Requested by [signature] Date 3/20/97

Recommended by [signature] Date 3-24-97

Department Head

To be completed by Bookstore:

Quantity of discontinued texts left over ____

Estimated loss ____

Date ____ Signed ____

Course Book Department

IMPORTANT: Kindly initiate at least one semester prior to the time you plan to use the book.

If this adoption replaces a text, the form entitled "Intent to Discontinue Textbook" should precede it. Processing of the "Intent" is requested within 60 days, if possible, following the beginning of the fall semester in order to permit the Bookstore to dispose of surplus stock.

White — Department Head's Copy
Green — Bookstore's Copy
Canary — File Copy

PROPOSED CHANGES

FERRIS STATE UNIVERSITY
APPLICATION FOR CHANGE OR ADOPTION OF TEXTBOOK

Course number(s) MECH 240

Course title Statics and Strength of Materials

Title of new textbook desired? Statics and Strenth of Materials, 3rd edition List price

Author Harold W. Morrow Publisher Prentice Hall

Date effective Summer 1997 Publisher's address Rt 9 W

ISBN# 0-13-844720-9 Englewood Cliffs, NJ 07632

Book # Publisher's phone 800-526-0485

Approximate number of new textbooks needed each term? 230/year Copyright date or edition? 1997, 3rd ed.

Title of textbook to be discontinued Statics & Strength of Material A Parallel Approach Date adopted Summer 1993

Author L.J. Wolf Publisher Prentice Hall

Requested by Charles G. Drake Date 3/1/97

Recommended by Douglas Chase (Department Head) Date 3-3-97

To be completed by Bookstore:

Quantity of discontinued texts left over

Estimated loss

Date Signed (Course Book Department)

IMPORTANT: Kindly initiate at least one semester prior to the time you plan to use the book.

If this adoption replaces a text, the form entitled "Intent to Discontinue Textbook" should precede it. Processing of the "Intent" requested within 60 days, if possible, following the beginning of the fall semester in order to permit the Bookstore to dispose of surplus stock.

4/93 Rev.

White — Department Head's Copy
Green — Bookstore's Copy
Canary — File Copy

PROPOSED CHANGES

FERRIS STATE UNIVERSITY

APPLICATION FOR CHANGE OR ADOPTION OF TEXTBOOK

Course number(s) MATL 240 -

Course title Introduction to Material Science

Title of new textbook desired Engineering Materials, Properties & Selection List price

Author Budinski, Kenneth Publisher Prentice Hall

Date effective Winter, 1996 Publisher's address

ISBN# 0-13-367715-X

Book # Publisher's phone

Approximate number of new textbooks needed each term? 50 Copyright date or edition? 5th 1996

Title of textbook to be discontinued Date adopted

Author Publisher

Requested by David H Anderson Date SEPT. 95

Recommended by Doug Chase Date 3-11-97
Department Head

To be completed by Bookstore:

Quantity of discontinued texts left over

Estimated loss

Date Signed
Course Book Department

IMPORTANT: Kindly initiate at least one semester prior to the time you plan to use the book.

If this adoption replaces a text, the form entitled "Intent to Discontinue Textbook" should precede it. Processing of the "Intent" is requested within 60 days, if possible, following the beginning of the fall semester in order to permit the Bookstore to dispose of surplus stock.

4/93 Rev.

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Green — Bookstore's Copy
Canary — File Copy

APPENDIX H

MET FACULTY CONSULTING ACTIVITIES

AMERIKAM®

November 12, 1996

George Olsson, Ph.D.
Professor
College of Technology
Ferris State University
915 Campus Drive
Big Rapids, Michigan 49307-2291

Dear George:

Thanks so much for taking the time to review my engineering issues. How clear and easily understood are the problems of life when you are helped by a good teacher! Your solutions helped get us back on track and with a much better understanding of the mechanics of our project.

Thanks again!

Yours truly,

Bob Creswell
Chairman
AMERIKAM

RSC/amk

cc. Dr. Teshoma Abebe,Provost and Vice President
Dr. Mark A Curtis, Interim Dean, College of Technology

1 enclosure

1337 Judd Avenue, S.W. • Grand Rapids, Michigan 49509-1096
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U.S.A.

Telephone: 517-435-7741
Telex: 227488
Fax: 517-435-2821
Internet: 102557.2203@Compuserve.Com

February 28, 1997

Charles G. Drake, P.E.
FERRIS STATE UNIVERSITY
Swan Building Room 109
901 S. State Street
Big Rapids, MI 49307-2295

RE: Platen-Upper CT-800 - dwg. 498D65870

Attn: Charles G. Drake, P.E.

Dear Sir:

Please find enclosed a drawing of the "Platen-Upper CT-800." We are looking for a stress and strain analysis. There is a total load of 56,000 pounds on the areas marked in red.

Please give me a call with the cost to do the above.

Sincerely,

Al Arends

Al Arends
Senior Designer

AA:sr
arends.doc

Enclosure - Dwg. 498D65870 pg. 1 thru 4

FINAL REPORT

FINITE ELEMENT STUDY OF

PLATEN DRAWING NUMBER 36670

FOR

BROWN MACHINE DIVISION

TRAFALGAR HOUSE, INC.
P.O.BOX 434
BEAVERTON, MICHIGAN 48612

BY

CHARLES G. DRAKE, P.E.

FERRIS STATE UNIVERSITY

TECHNOLOGY TRANSFER CENTER
1020 EAST MAPLE STREET
BIG RAPIDS, MICHIGAN 49307-1676

JUNE 3, 1996

APPENDIX I

PROFESSIONAL DEVELOPMENT ACTIVITIES

1997 MICHIGAN TEACHERS OF MECHANICS CONFERENCE

Monday, April 14, 1997

Grand Valley State University
Grand Rapids, MI

FINAL CONFERENCE ANNOUNCEMENT

This one day conference will bring together teachers of mechanics in an informal forum to encourage improvements and innovation in the teaching of mechanics.

CONFERENCE SCHEDULE

MORNING PROGRAM

8:30 A.M. **Registration & Check-in**

9:00 **"http://claymore.engineer.gvsu.edu"**
by Hugh Jack, Grand Valley State University
A review of courses taught employing Internet Resources, Working Model, and MathCAD software. Included will be a discussion of advantages, disadvantages, successes and pitfalls.

9:50 **"Mathematical Visualization Skills and Use of Multiple Intelligences Theory in Teaching Design"**
by Shirley Fleischmann, Grand Valley State University

One of the most difficult design activities for students is modeling. In building math models, the ability to visualize mathematical operations is essential. For faculty who completed their education in an environment substantially different from that in which our students now learn, the expectations and the visual images available can be quite different. Faculty who are not aware of this can find themselves puzzled about what student do not understand, and students often find themselves so confused that they don't know where to begin asking questions. Included will be student data to help us understand how they think about math and in what way they can use math creatively.

10:40 **"Mechanics Reform"**
by Robert Soutas-Little, Michigan State University & Daniel Inman, Virginia Polytechnic & State University

An educational change called "Calculus Reform" is moving through mathematics departments. This change is driven by the use of computational software. A similar reform is proposed for Statics and Dynamics.

11:30 **Lunch** - Provided courtesy of the GVSU - Padnos School of Engineering

- CONTINUED -

1997 MICHIGAN TEACHERS OF MECHANICS CONFERENCE

AFTERNOON PROGRAM

1:00 P.M. **"Challenges and Pitfalls in Evaluating Students"**
by Nava Sivron, Grand Valley State University

This presentation is based on data collected at Montana State University as part of a research project on the subject of students misconceptions in translational and rotational kinematics. The discussion will include examples from test result, and how to evaluate them.

1:50 **"ANSYS Computer Aided Design and Analysis"**
by William Bryan, ANSYS Inc.

An overview of the capabilities and design potential of using ANSYS and AutoCAD in the mechanical engineering curriculum.

2:40 **"A Mechanical Measurements Course as the Capstone of an Associates Degree Program in Mechanical Engineering Technology"**
by George R. Olsson, Ferris State University

A mechanical measurements laboratory is used to bring together themes from instruction in statics and strength of materials, fluid mechanics, and electronics. Students are introduced to statistics by analyzing their own data. Theories developed in prior course work provide the experimental hypotheses.

3:30 **Group Discussion**

REGISTRATION

There is **no cost** to attend the conference. Grand Valley State University has been kind enough to underwrite the cost of this year's activities. Same day registrants are welcome, however, ***advanced registration not later than April 4, 1997 is encouraged*** to assist in planning for lunch arrangements.

To register for the conference, please complete the enclosed registration form and return to Paul Plotkowski at Grand Valley State University by fax to (616) 771-6642 or e-mail PlotkowP@gvsu.edu.

ADDITIONAL INFORMATION

For further information contact Paul Plotkowski at (616) 771-6750 or e-mail PlotkowP@gvsu.edu.

Ferris State University

Request for Institutional Travel

Requisition Number
Department Use

Travel Number
Accounting Office Use Only

DATE	SOC SEC. NO.	NAME
3/13/97	269 30 0908	George R. Olsson

START TIME	☐ A.M. ☐ P.M.	DATE	DEPARTMENT
6:30am		4/14/97	DMGA

RETURN TIME	☐ A.M. ☐ P.M.	DATE	
7:00pm		4/14/97	☒ FACULTY ☐ STAFF

DESTINATION AND REASON FOR TRAVEL

Allendale, MI, Grand Valley State University. To attend and present a paper at the Annual Meeting of teh Michigan Teachers of Mechanics.

TRANSPORTATION

UNIVERSITY VEHICLE	PRIVATE VEHICLE	EST. MILES
☐	☒	144

DRIVER'S NAME

PASSENGER NAME(S)

COMMERCIAL AIRLINES ☐ OTHER (SPECIFY) ☐

If using a University vehicle, an approved copy of this form with your deparmental account number on it must be presented to the Motor Pool office before a state car will be released

Advances		Estimated Expenses	
CASH	$	AIRLINE	$
ACCTS PAY AIRLINE		UNIVERSITY VEHICLE	
LODGING		PRIVATE VEHICLE	$43.20
REGISTRATION		CONFERENCE	
OTHER		LODGING	
TOTAL	$	MEALS	25.00
		OTHER (SPECIFY)	
		TOTAL ESTIMATED EXPENSES	$ 68.20
		REIMBURSEMENT LIMIT	$

For value received I promise to pay to the order of Ferris State University, or to submit properly approved and supported expense documentation, to clear all travel advances issued in connection with this Request for Institutional Travel. If the amount is not cleared within 30 days after my return, I authorize the deduction of the above amount from my payroll check.

George R. Olsson 3-13-97
Employee Signature Date

	DATE	ACCOUNT NAME	ACCOUNT NO	
DEPARTMENT HEAD Mary Chase	3-13-97	MECH	2-39420-4475	$
DEAN OR DIRECTOR	DATE	ACCOUNT NAME	ACCOUNT NO	$
VICE PRESIDENT	DATE	ACCOUNT NAME	ACCOUNT NO	$
ACCOUNTING	DATE	ACCOUNT NAME	ACCOUNT NO	$

ACCT - 7/90

MOLDFLOW PTY. LTD.
5500 Executive Center Drive, Suite 232 ■ Charlotte, NC 28212
TEL: (704) 566-1148 ■ FAX (704) 566-1147

November 25, 1996

Mr. Chuck Drake
FERRIS STATE UNIVERSITY
Mechanical Engineering Technology, Swan 109
Big Rapids, MI 49307

Dear Mr. Drake:

This letter acknowledges receipt of your registration for the December 2 - 6 1996 MF/FLOW training being held at Moldflow Pty. Ltd., 4341 S. Westnedge, Suite 2109, Kalamazoo, Michigan.

Enclosed please find a Moldflow Design Principles book and Units 2, 7 and 8 of the Moldflow training manual, which are being supplied to you as part of the MF/FLOW training course and must be brought with you when you come to training. Please work on these units and review the Design Principles, as doing this will give you a better understanding of the modeling and the principles on which the training course is based.

Listed below are daily starting times for the course:

SEMINAR HOURS:

Morning Sessions	Lunch	Afternoon
Monday 8:30 am - 12 pm Location - Moldflow	12 pm - 1 pm	1 pm - 5 pm
Tuesday thru Friday 8 am - 12 pm Location - WMU*	12 pm - 1 pm	1 pm - 5 pm

* Directions and a map to Western Michigan University will be given to you at Moldflow on the first morning of the seminar.

Note: You will be on your own for lunch.

If you have any questions, please give me a call at (704) 566-1148.

Sincerely,
MOLDFLOW PTY. LTD.

Karen V Hjerpe

Karen Hjerpe
Training Administrator

Ferris State University

Travel Expense Voucher

Requisition Number
Department Use

Travel Number
Accounting Office Use Only

DATE 12/9/96	SOC. SEC NO. 364485662	NAME Chuck Drake
START TIME 6:00 ☒ A.M. ☐ P.M. DATE 12/2/96	RETURN TIME 9:00 ☐ A.M. ☒ P.M. DATE 12/6/96	ADDRESS
DEPARTMENT DMCA		CITY / STATE / ZIPCODE

DESTINATION AND REASON FOR TRAVEL
KALAMAZOO, MI
MOLDFLOW TRAINING

EXPENSES

Travel Dates								Amount
Meals	125.00	(5 days)						$125.00
Lodging (a)								
Airline (a)								
Taxi & Limousine								
Personal Car MILES 216	64.80							64.80
Conference Fees (a)								
Parking								
Tolls								
Bus. Meals/ Entertainment (a,b)								
Other (specify)								

Total Expenses		$ 189.80
Less Cash Advance Received	0-11340-1340	
Balance Due Employee		$ 189.80
Balance Due University		$

University Vehicle -- miles traveled [ ] X rate [ ] = $

Employee Signature [signature] Date Dec 9, 1996

(a) Original receipts required. (b) Provide purpose, names and organization, and place of meeting

	DATE	ACCOUNT NAME	ACCOUNT NO	$
DEPARTMENT HEAD Doug Chase	12-9-96	MECH	239420 4475	$ 189.80
DEAN OR DIRECTOR				$
VICE PRESIDENT				$
ACCOUNTING				$

ACCT 7-92

FERRIS STATE UNIVERSITY

March 17, 1997

Chuck Drake
College of Technology
SWN 109

Dear Chuck,

I am pleased to inform you that you have been chosen to participate in the 2nd Summer Faculty Institute to be held May 13-15, 1997. I have enclosed a list of all participants for the three-day institute for your information.

More information will be sent to you as the date approaches. In the meantime, if you should have any questions, or if circumstances arise that would prevent your attendance, please call Marsha or me at the Center.

I look forward to your participation in this year's institute.

Cordially,

Henryk R. Marcinkiewicz
Director

HRM:mjm

Enclosure

CENTER FOR TEACHING, LEARNING
AND FACULTY DEVELOPMENT
1349 Cramer Circle, BIS 416, Big Rapids, MI 49307-2737
Phone 616 592-3826 Fax 616 592-3592
E-Mail marcinkh@zip01.ferris.edu

APPENDIX J

COMPUTER UPGRADE FOR MEASUREMENTS LABORATORY

Page

FERRIS STATE UNIVERSITY

MEMO

TO: G. R. Olsson, Program Coordinator, MET Program

FROM: J. Jones, Computer Resources Coordinator

DATE: March 14, 1997

SUBJECT: Computer Equipment Upgrade for Measurements Laboratory

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As per our discussion on March 13, 1997, we have formulated a plan to upgrade the computer equipment in Swan 302, the Mechanical Measurements laboratory. The existing hardware does not have the capacity to run our most recent University spreadsheet software, such as Microsoft EXCEL version 5. We will make the following upgrade:

Present System	Replacement System
4 Mb Ram	8 Mb Ram
105 Mb Hard Drive	240 Mb Hard Drive

This upgrade will also allow better utilization of your 16 bit high speed data acquisition system.

COLLEGE OF TECHNOLOGY
Johnson 200, 1009 Campus Dr., Big Rapids, MI 49307-2890

APPENDIX K

NEW VERSION OF EEET 215 FOR MET STUDENTS

Ferris State University

College of Technology

MEMO

TO: Phillip P. Marcotte, Program Coordinator
Electrical and Electronics Engineering Technology

FROM: George R. Olsson, Program Coordinator
Mechanical Engineering Technology

DATE: March 14, 1997

SUBJECT: Revision of EEET 215, Electricity and Electronics for MET Students

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Because of recent changes in the Mechanical Engineering Technology curriculum, it is necessary to revise the electrical course you offer for our MET students. Formerly, the math, physics, and electronics courses were in the following sequence:

1st Year Fall Semester	1st Year Winter Semester	2nd Year Fall Semester	2nd Year Winter Semester
MATH 116	MATH 126		
	PHYS 211	EEET 215	EEET 225
			MECH 221

Starting Fall 1996, the sequence now is:

1st Year Fall Semester	1st Year Winter Semester	2nd Year Fall Semester	2nd Year Winter Semester
MATH 116	MATH 126	MATH 216	
	PHYS 211	PHYS 212	EEET 215
			MECH 221

The new version of EEET 215 should have PHYS 212, which contains electrical topics, as a prerequisite. It may also have a sprinkling of introductory calculus notions. MECH 221, our mechanical measurements course, includes a number of topics that in the past have been supported by your EEET 215 - EEET 225 sequence. These include Wheatstone bridge circuits, amplifiers, and analog - digital conversion.

It has been suggested that our students should also be introduced to PLC programming. Would such a topic fit into the revised curriculum? Those of our students who ladder into B.S. programs in Manufacturing or Product Design take electrical courses that do cover PLC's.

The first cycle of the revised EEET 215 will occur Winter 1998. Please pass this on to those of your faculty who have been involved in teaching EEET 215 and EEET 225. Thanks.