

Electronics / Electrical
Engineering Technology

APRC 1995-1996

section 1 of 2

ELECTRONICS 95-96

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
ELECTRICAL/ELECTRONICS DEPARTMENT

Program Review

of the

**Bachelor of Science in Electrical/Electronics
Engineering Technology**

1995 - 1996

February 28, 1996

DOUG HANELINE
APRC 95-96 CYCLE

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY
ELECTRICAL/ELECTRONICS DEPARTMENT

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Engineering Technology**

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Program Review Panel

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February 28, 1996

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SECTION 1 **BSEET PROGRAM OVERVIEW**

This report covers the program review of the Bachelor of Science in Electrical/Electronics Engineering Technology degree at Ferris State University.

The mission of the Electrical/Electronics Department is to educate students in electrical/electronics programs valuable to Michigan's economic future and to provide educational services to business and industry. The curricula of engineering technology with complementary technical specialty programming integrates the appropriate general education courses needed to prepare today's graduates with the foundation of knowledge required to cope with advancing technology within their professional careers.

The Electrical/Electronics Department is committed to providing its diverse student body with strong technical curricula emphasizing practical, usable skills that prepare the graduate to analyze, synthesize and problem-solve within their discipline. Students are perceived as being individuals who have enrolled in programs to become employable and prepared for advancement in their chosen careers after graduation. The department takes this trust seriously, and provides curriculum laddering options for two-year A.A.S. degree program graduates to transfer into four-year B.S. degree program.

The BSEET program was opened to enrollment in the fall of 1984. The first graduates produced by the program were in the spring of 1986. The first class was approximately twelve students. Enrollment climbed to a high of forty-two in 1993 and then dropped to approximately thirty enrolling in 1995. (These numbers are quoted as 'approximate' since they are the numbers enrolled in the junior EEET classes and differ slightly from the 'official' numbers used by the university.)

This program serves technological needs of community, state, and nation by providing graduates with a well rounded education and a firm foundation in the electrical/electronics fundamentals and advanced topics which insures that they will be productive individuals from the first day on the job through their life-time careers.

The program recently received Technology Accreditation Commission/Accreditation Board for Engineering and Technology (TAC/ABET) accreditation and will continue to improve so as to retain this accreditation and to make its graduates more in demand. The Industrial Advisory Committee provides valuable input which will insure continued growth and improvement.

SECTION 2

GRADUATE FOLLOW-UP SURVEY

Included in this section is graduate data that the department has collected indicating names, titles, and companies. Surveys conducted by the Technology Transfer Center for 1990 and 1992 received insufficient response to be statistically valid. The 1995 survey is in the final stages at the Technology Transfer Center and was not available for this report.

Summary of Results

The overall response of the graduate follow-up survey demonstrates:

1. **There was 100% placement of the 1995 graduates.**
2. **The starting salary range was \$32,000 - \$42,000 for the 1995 graduates.**
3. **61% of the 1995 graduates hold the title of "Engineer".**
4. **In the years 1986 through 1994, 44% of the graduates held the title of "Engineer".**
5. **100% of our graduates are employed in their field of study.**
6. **Ferris BSEET graduates are finding positions with prominent companies.**

1995 Winter Semester Graduates Electrical/Electronics Department

	NAME	COMPANY	STATE	TITLE
95	AMARANDEI, OVIDIU D	Omega Company	MI	Engineer
95	AMARO, TROY J	Progressive Technologies	MI	Controls Engineer
95	ARENSEN, KYLE D	Miller-Moorehead	MI	Controls Engineer
95	ATHY, JOHN P	Fori Automation	MI	Electrical Engineer
95	BLAIR, RAYMOND A	Haworth	MI	Electrical Engineer
95	COTTRELL, DAVID E	A-OK Controls	MI	Controls Engineer
95	CRUTTENDEN, THOMAS W	Miquet Corp.	MI	Engineer
95	ESILINE, TODD LEE	Industrial Grinding	MI	Machine Design and Start-up
95	EVERETT, JAMES A, JR	EW Bliss	MI	Design Engineer
95	GOMEZ, JUAN CARLOS			Employed in Columbia
95	LACOMBE, DUANE R	Altron Automation	MI	Controls Engineer
95	LE, LONG BAO	Jet Electronics	MI	Technician
95	LITTLE, JOHN S, JR	Progressive Technologies	MI	Controls Engineer
95	MARTIN, JAMIE K	Applied Manu. Technologies	MI	Systems Engineer
95	OKHUYSEN, THOMAS P	Thermotron	MI	Grade C Electronic Tech
95	OSTROWSKI, IWONA	EDS	MI	Engineer
95	PAWLOWSKI, BRIAN J	Peer Division	MI	Electrical Design Engineer
95	PIECIAK, ROBERT J	Ferris State University	MI	Technician
95	PRANGER, CHAD R	Grand Haven Area Public Schools	MI	LAN Support Specialist
95	SMITH, SCOTT ALLEN	General Motors Corp.	MI	Maintenance
95	THOMAS, KENNETH J	Nartron	MI	Lab Technician
95	WINCHELL, DARRELL O.	Bethlehem Steel	IN	Technical Assistant
95	WITTKOSKI, MARK V	WGVU-TV	MI	Engineer

1986 - 1995 GRADUATES ELECTRICAL/ELECTRONICS DEPARTMENT

Year	Name	Company	State	Title
95	AMARANDEI, OVIDIU D	Omega Company	MI	Engineer
95	AMARO, TROY J	Progressive Technologies	MI	Controls Engineer
95	ARENSEN, KYLE D	Miller-Moorehead	MI	Controls Engineer
95	ATHY, JOHN P	Fori Automation	MI	Electrical Engineer
95	BLAIR, RAYMOND A	Haworth	MI	Electrical Engineer
95	COTTRELL, DAVID E	A-OK Controls	MI	Controls Engineer
95	CRUTTENDEN, THOMAS W	Miquet Corp.	MI	Engineer
95	ESILINE, TODD LEE	Industrial Grinding	MI	Machine Design and Start-up
95	EVERETT, JAMES A, JR	EW Bliss	MI	Design Engineer
95	GOMEZ, JUAN CARLOS			Employed in Columbia
95	LACOMBE, DUANE R	Altron Automation	MI	Controls Engineer
95	LE, LONG BAO	Jet Electronics	MI	Technician
95	LITTLE, JOHN S, JR	Progressive Technologies	MI	Controls Engineer
95	MARTIN, JAMIE K	Applied Manu. Technologies	MI	Systems Engineer
95	OKHUYSEN, THOMAS P	Thermotron	MI	Grade C Electronic Tech
95	OSTROWSKI, IWONA	EDS	MI	Engineer
95	PAWLOWSKI, BRIAN J	Peer Division	MI	Electrical Design Engineer
95	PIECIAK, ROBERT J	Ferris State University	MI	Technician
95	PRANGER, CHAD R	Grand Haven Area Public Schools	MI	LAN Support Specialist
95	SMITH, SCOTT ALLEN	General Motors Corp.	MI	Maintenance
95	THOMAS, KENNETH J	Nartron	MI	Lab Technician
95	WINCHELL, DARRELL O.	Bethlehem Steel	IN	Technical Assistant
95	WITTKOSKI, MARK V	WGVU-TV	MI	Engineer
94	Kreger, Robert	Gentex, Corp.	MI	
94	Kuhl, Douglas	Saurer Automation System, Inc	MI	

94	McCrackin, Paul	Evart Products	MI	
94	O'Neil, Jeff	Guardian Fiberglass	MI	Electronics Technician
94	Pond, Dean	Universal Systems	MI	Engineering
94	Thorsen, Alan	Mead Paper Comp.	MI	
94	Visscher, Paul	BOS Consulting & Design	MI	Controls Engineer
94	Wesch, Kendall	K-R Automation	MI	
94	Wittlieff, Raymond	Ameritech	MI	Splicing Technician
93	Carpenter, Kevin	AVL	MI	Development Engineer
93	Garner, Amy	Trane, Inc.	MI	Product Support Engineer
93	Gavan, Shawn	Tele-Connect Plus	MI	Software Engineer
93	Hogan, Paul	Tectron, Inc.	MI	Project Engineer
93	Holmes, Robert	RH Electronics	MI	Technician
93	Lentner, Stephen	Tectron, Inc.	MI	Project Engineer
93	Parker, David	CMI	MI	
93	Paull, David	Micro Logic	MI	Design Technician
93	Thede, Scott	Ferris State University	MI	CAD System Integrator
93	Utter, Gary	Lazer-Alignment	MI	R&D Engineer
93	Willemsen, Dennis	Gordon Food Service	MI	Electrical Technician
93	Wiser, Robert	FIAMM	MI	Electronic Technician
93	Zajac, Paul	Nartron	MI	Applications Engineer
92	Ball, Patrick	BMB Architects & Eng.	MI	Electrical Designer
92	Besaw, David	Evart Products - Textron	MI	Systems Supervisor
92	Carroll, John	Pioneer Hi-Bred	MI	Electrician
92	Dashner, Scott	Dynamic Design	MI	Project Engineer
92	Herrick, Randy	Novak Engineering	MI	Engineering Analyst
92	Hoffman, Steven	Eaton Corp.	MI	
92	Kwasniewicz, Chris	Ford Motor Comp.	MI	
92	Matthews, Victor	Stiles Machinery	MI	
92	McGinnis, Mark		MI	

92	Shonk, Carl	AVL	MI	
92	Thompson, Scott	Gentex	MI	Software Technician
92	Worden, Joseph	Flex-Cable	MI	
91	Arnold, Cecil	Belize Food Prod.	Belize	Electrical Engineer
91	Barnaby, Gerald	Amtek	MI	Controls Engineer
91	Danks, John	A-OK Controls	MI	Controls Engineer
91	Linh, Yen	X-rite, Inc.	MI	Instrument Assembly
91	Maleski, Michael	Trane Co.	MI	
91	McCullough, Craig	Johnson Controls	MI	Electrical Designer
91	Meinders, Kurt	Compucraft, Inc.	MI	Technical Support
91	Porter, Derek	GM Truck & Bus	MI	
91	Possanza, Jeffrey	Leightronix, Inc.	MI	Sales/Product Development
91	Ramey Jr., Jesse	Advanced Electronics	MI	Technician
91	Rohrer, Conrad	Michigan Consolidated Gas Company	MI	Electronics Technician
91	Schaefer, William	Donnelly Corp.	MI	Product Design Engineer
91	Talbot, Kevin	GM Truck & Bus	MI	
91	Taylor, William	Grand Valley Mfg. Ltd.	MI	Assembler
91	Thelen, Charles	General Motors	MI	Project Engineer
91	Theodore, Harry	National Education Center	MI	Instructor
91	Tyson, Craig	Bethlehem Steele	IN	Technical Assistant
91	Velez, Alan	Service Master, Inc.	MI	Bio-Med. Technician
91	Wallace, Donovan	Grand Rapids CC	MI	Computer Support Technician
91	Westfall, David	K-R Automation	MI	Controls Engineer
90	Anderson, Brent	Batts, Inc.	MI	Maintenance & Machine Repair
90	Antenucci, Nick	Chrysler	MI	
90	Bendall, Kevin	Premier Corrugated	MI	Electrical Engineer
90	Brower, Kevin	Amway Corp.	MI	Electrical Engineer
90	DeFever, Dan	JET Electronics	MI	Customer Service Analyzer

90	Ferris, Donald	GM Truck & Bus	MI	
90	Fisher, Eric	Digital Control	MI	
90	Grimes, Russell	Johnosn Controls	MI	Sr. Electrical Designer
90	Kiersey, Jeffrey	Ecco Systems	MI	Engineer/Technician
90	Kosicki, Ronald	Teledial	MI	
90	McFeggan, Ann	Vari-Tech	MI	Engineering Sales
90	Mooney, Todd	Bendix/Automotive System	MI	Engineer
90	Neal, Brian	K-R Automation	MI	Controld Design Engineer
90	Neuenfeldt, Jeffrey	Allnet	MI	Electrical Engineer
90	Novak, Ed	R.D. Wener	MI	Electrical Engineer
90	Quandt, Stephen	Owens-Brockway	NJ	Production Supervisor
90	Servia, Mark	Advance Systems, Inc.	WI	Controls Designer
90	Tasiemski, Michael	Dean Foods Fluid Milk Div.	IL	Maintenance Man
89	Bennett, Daniel	Engineered Control	MI	Controls Engineer
89	Cross, John	Lakeland Electrical Serv.	MI	Wireman/Technician
89	Dowling, Dale	J.D. Phillips Corporation	MI	Electrical Engineer
89	Gibson, Shawn	Hi-Ram, Inc.	MI	Electronic Engineer/Supervisor
89	Gilbert, Daniel	Northern Telecom	MI	Electronics Tester
89	Hemingway, Jeffery	CDI	MI	Electrical Engineer
89	Kosak, Michael	M.K. Electronics	MI	Owner
89	Lange, Tom	Dendix Brake & Chassis	MI	Lab Technician
89	McGiverin, Kevin	Commercial Equipment	MI	Field Service Technician
89	Myers, Kyle	Coleman Electric	MI	Electrician
89	Paquette, Joe	Wanda Davis Comm.	MI	Sales
89	Riffle, Kevin	Target Communication	MI	Project Engineer
89	Roe, Keith	Evert Products Co.	MI	Programmer/Analyst
89	Telgenhoff, Richard	Thermotron, Inc.	MI	Designer
89	Trzybinski, Peter		MI	Controls Engineer
89	Vollema, Rick	Ford Motor Comp. Truck Operations	MI	Product Design Engineer

89	Woerdenhoff, Chris	Zenith Data Systems	MI	Technical Writer
88	Banks, Dennis	Ford Motor Co.	MI	Engineer
88	Bannister, Steven	APV Chemical Machinery	MI	Elec. Desgin Engineer
88	Bates, Dale	Micro Soft Corporation	WA	Manufacturing Engineer
88	Braden, Gregory	Owens-Brockway	KY	Engineer
88	Cote, Todd	Rexair, Inc.	MI	Electronic Technician
88	Czurak, Gerard	Smith Instrument Corp.	MI	Inside Sales
88	DeBoer, Brian	Gould Foil	OH	Electrical Engineer
88	DuRussel, Henry	Prince Machine	MI	Service Technician
88	Gilbert, David	Owens-Illinois	OH	Engineer
88	Hanses, Daniel	Dale Computer Corp.	MI	Lab Technician
88	Hunter, Douglas	DeBolt Design Service	MI	Circuit Board Designer
88	James, Todd	Owens-Illinois	OH	Engineer
88	Johnson, Richard M.	Summit & Palmer	MI	Electrician
88	Koch, David	DeBolt Design Service	MI	Electrician
88	Macioszek, Edward		MI	Engineering Manager
88	Neff, Keith	Prince Machine	MI	Field Service Technician
88	Neumann, Douglas	Lucas Cirtek	MI	Mfg. Systems Engineer
88	Noonan, Jeffrey	Electronic Data System	MI	
88	Quinnan, Roger	Computer Output Proc.	MI	Service Technician
88	Schillaci, Steven	Brunswick Corp.	MI	Support Line Technician
88	Smidstra, Colin	Prince Corporation	MI	Electronic Design Engineer
88	Tressler, Steven	Cohr Engineering Services	MI	Bio-Medical Technician
88	VanderPloeg, Michael	Heath Co.	MI	EE Technician
88	Zambrano, Fausto	Ferris State University	MI	Technician
87	Babcock, Paul	Independent Labs		Software Srv. Technician
87	Barnes, Danny	Department of the Navy		Airman
87	Colvin, Ron	Allen Test Products	MI	Software Engineer
87	Gothberg, John	Union Electric	MI	Electrician
87	Johnson, Douglas	Hitachi Magnetics	MI	Electronics Technician

87	Kebler, Glenn	Ferris State University	MI	EET Professor
87	Keillor, Tom	Tecumseh Products	MI	
87	Kienitz, Tom	Nartron Corp.	MI	Dir. Electronic Manufacturing
87	Kuhn, Kevin	Ford Motor Co.	MI	Electrical Controls Engineer
87	Linehan, Kevin	Great Lakes Steel, Div. Nat'l Steel		Repair & Control Operator
87	Machniak, John	Randers Engineering	MI	Electrical Engineer
87	Martens, Rodney	Group Five Comp.	MI	President
87	Miller, Matt	Tecumseh Products	MI	
87	Newman, Todd	Nartron Corp.	MI	Associate Design Engineer
87	Simpson, Robert	Independent Labs		Hardware Service Technician
87	Sopocy, Kevin	Dexter Rim & Wheel (Philips Industries)	IN	Maintenance Supervisor
87	Terhall, Tom	Advance Test Equipment	MI	Senior Project Engineer
87	Thompson, Richard	G.E., ACSD	NY	Reliability Engineer
86	Dessinger, Joe	Cleveland Mach. Cont.	MI	Field Service Engineer
86	Freeman, William	Freeman Machine Corp.	MI	Second VP/Finance
86	Howard, Dave	China Lake Naval Weapons Ctr.	CA	Electronic Repair Technician
86	London, Steven	Bekum America Corp.	MI	Supervisor Electrical Engineering Industrial Machines
86	Longstreet, Rod	Cooper Power Systems	WI	Service Engineer
86	Myers, Kirk	Bekum Am. Corp.	MI	Electronic Design Engineer
86	Periard, Steve	Saginaw Valley State University	MI	Electronic/Physics Technician
86	Roleson, William	Randers Engineering	MI	Electrical/Industrial Engineer
86	Sandy, Mike	Federal Mogul	MI	Process Engineer
86	Wallstead, Joe	Davis, Inc.	MI	Project Engineering Supervisor
86	Willison, Robert	Ferris State University	MI	EET Professor

SECTION 3
EMPLOYER FOLLOW-UP SURVEY

The results of 1995 Employer Follow-up Survey are attached along with the comments made by the employers. One hundred fifty surveys were mailed to employers and 29 responses were received. This constitutes a 19.3 % return. Two attempts were made to encourage employers to respond to this survey.

Summary of Results

The overall response of the employer survey demonstrates:

1. **The BSEET graduate has a high ability to perform assigned tasks.**
2. **The BSEET graduate has above average motivation and initiative.**
3. **The BSEET graduate has an above average characteristic for taking responsibility.**
4. **The BSEET graduate has high self-esteem and self-confidence.**
5. **The BSEET graduate has an overall high rating.**

SECTION 4
STUDENT EVALUATION OF PROGRAM

Surveys were administrated during normal lecture hours. Attending students were encouraged to participate. The surveys were anonymous. Students not present at the time of the survey were also encouraged to complete it in the Electrical/Electronics Department office. It was felt that truer results would be obtained by performing the survey in the classroom without influence from others. The percentage of students completing the survey were approximately:

- 83% of the Third and Fourth Year students and
- 57% of the First and Second Year students.

The lower participation of first and second year students is due primarily to first year drop out. The survey was collected at the end of the Fall semester. Initial enrollment numbers were used to calculate participation.

Summary of Results

The overall response of the student survey demonstrates:

- 1. A desire to continue education beyond the BSEET.**
This information can be applied to direct our BSEET program as well as help plan additional programs in the EET Department. (Question #6)
- 2. Optimism and enthusiasm regarding careers in electronics.**
Although student perceptions of their career opportunities are good, surveys indicate the department could act to further increase expectations. Positive feedback of career opportunities and salaries would help motivation particularly in the third and fourth year. (Questions #7-13)
- 3. Department Administration is doing a good job.**
These results were consistent for all students levels. (Question #14)
- 4. Faculty are knowledgeable and helpful.**
These results were consistent for all student levels. (Questions #17-21)
- 5. Courses are challenging and well presented.**
First and second year students gave excellent reviews to the curriculum developing critical thinking skills. (Questions #22-27)
- 6. Laboratories are in good health.**
All years responded good in this area. However, first and second year students gave noticeably better reviews than third and fourth year students. (Questions #28-31)

7. Computer Equipment and services are keeping up with technology and users.

Third and fourth year students, however, gave only fair reviews for availability of computer support services. These students have more sophisticated software needs and require extensive use of computers. After hours support for these students should be considered. (Questions #32-36)

8. Related Courses are relevant and of good quality.

Reviews were generally good for related courses. First year students ranked the relevance of their math course to the BSEET as excellent. (Questions #37-44)

9. Professional Societies are beneficial to students.

As expected the fourth year students provided the best reviews here. (Question #45)

Survey Sample

Purpose:

Ferris State University periodically conducts a review of all its programs. This year is our turn. Your input to this process is very important. As you take this survey, realize that your responses are taken seriously and will affect the direction, growth, and perception of the BSEET program.

Instructions:

- Read each question carefully.
- Select the response that best qualifies your answer.
- Use a #2 pencil to mark your answer on the scantron sheet.

A. Academic Status

1. Indicate your academic status:
1 = Freshman; 2 = Sophomore; 3 = Junior; 4 = Senior
2. Indicate your academic status when you began at, or transferred into the EET Program at Ferris.
1 = First Year; 2 = Second Year; 3 = Third Year; 4 = Fourth Year; 5 = Pre-Technical

B. Interests and Intentions

3. Indicate your prime career interest.
1 = Design Engineering; 2 = Engineering Support and Applications; 3 = Technician; 4 = Management; 5 = Other _____
4. Indicate your prime field of interest.
1 = Communications; 2 = Computers/Digital; 3 = Industrial Automation; 4 = Education; 5 = Other _____
5. Do you expect to complete your BSEET Degree at Ferris State
1 = Yes; 2 = No; 3 = Unsure
6. Indicate your desire for education after the BSEET.
1 = Masters in Engineering or Technology;
2 = Business/Management Degree;
3 = Additional Bachelor Degrees in Engineering/ Computers/ Technology
4 = Other _____
5 = I will not pursue additional formal education.

Rank your response as follows:

- 1 = Strongly Agree;
- 2 = Agree;
- 3 = Somewhat Agree;
- 4 = Disagree
- 5 = Strongly Disagree
- No Response = Unsure

(If you strongly disagree, please tell us why. Use comment area or back of questionnaire.)

C. CAREER PERCEPTION

- 7. Graduate job placement is very good.
- 8. Graduate career opportunities are very good.
- 9. Graduate starting salaries are very good.
- 10. Salary growth potential in this field is excellent.
- 11. Electrical/Electronics technology will continue its rapid growth.
- 12. Ferris State's BSEET degree will provide a solid foundation for your career.
- 13. Ferris State's BSEET program has a good reputation in industry.

Rank your response as follows:

- 1 = Strongly Agree;
- 2 = Agree;
- 3 = Somewhat Agree;
- 4 = Disagree
- 5 = Strongly Disagree
- No Response = Unsure

(If you strongly disagree, please tell us why. Use comment area or back of questionnaire.)

D. PROGRAM SURVEY

- 14. The Department administration is helpful and courteous.
- 15. There are adequate career planning and placement services available.
- 16. When entering the EET program at Ferris, you were placed at the appropriate educational level.

- 17. EET department instructors are knowledgeable in their field.
- 18. EET department instructors are current in their field.
- 19. EET department instructors make themselves available outside classroom hours .
- 20. EET department instructors are helpful and courteous.
EET classroom instruction quality is good.
- 21. EET courses are challenging and informative.
- 22. EET courses lay a good foundation for follow-up courses.
- 23. EET course topics cover your areas of interest.
- 24. EET text books are of good technical quality.
- 25. EET laboratory work reinforces lecture material.
EET curriculum develops critical thinking skills (i.e. analytical and problem solving abilities).
- 26. Laboratory facilities are of good quality.
- 27. Laboratory equipment is current with industry.
- 28. Laboratory equipment is generally well maintained.
Laboratory equipment is available in adequate quantity.
- 29. Computers in the department are current with technology.
- 30. Computer tools are integrated into courses.
- 31. Computers and software are accessible during laboratory hours.
- 32. Computers and software are accessible outside of laboratory hours (late labs, network access, etc.).
Computer support services are available when I need them (tutoring, after hours assistance, etc.).
- 33. Technical Science electives are available for my interests.
- 34. Technical Science instruction is of good quality.
- 35. Math course material is relevant to the BSEET program.
- 36. Math instruction is of good quality.
- 37. Physics course material is relevant to the BSEET program.
- 38. Physics instruction is of good quality.
- 39. General Education courses provide a more rounded education that better prepares me for the workplace.
General Education instruction is of good quality.
- 40. Student professional societies (i.e. IEEE) benefit me.
- 41. BSEET program/instructors/societies promote student camaraderie.
- 42. The BSEET program provides quality education.

COMMENTS:

Results: Third and Fourth Year Students

Resulting Average = 2.5

Average : 1.0 - 2.0 EXCELLENT (Strongly Agree)
 2.1 - 3.0 GOOD (Agree)
 3.1 - 4 FAIR (Somewhat Agree)
 4.1 - 5 POOR (Disagree)

Surveys processed: 54 (32 Fourth Year and 22 Third Year)

Q#	Avg	1	2	3	4	5	
1		32	22				Indicate your academic status
2		<ul style="list-style-type: none"> • First Year = 23 • Second Year = 8 • Third Year = 22 • Fourth Year = 1 					Indicate your academic status when you began at, or transferred into the EET Program at Ferris.
3		<ul style="list-style-type: none"> • Design Engineering = 16 • Engineering Support and Applications = 29 • Technician = 7 • Management = 1 • Other = 2 					Indicate your prime career interest.
4		<ul style="list-style-type: none"> • Communications = 6 • Computers/Digital = 16 • Industrial Automation = 28 • Education = 2 • Other = 1 					Indicate your prime field of interest.
5		<ul style="list-style-type: none"> • Yes = 51 • No = 0 • Unsure = 4 					Do you expect to complete your BSEET Degree at Ferris State
6		<ul style="list-style-type: none"> • Masters in Engineering or Technology = 15 • Business/Management Degree = 4 • Additional Bachelor Degrees in Engineering/Computers/Technology = 12 • Other = 4 • I will not pursue additional formal education = 20 					Indicate your desire for education after the BSEET.
		1 Strongly Agree	2 Agree	3 Somewhat Agree	4 Disagree	5 Strongly Disagree	
7	2.5	11	20	12	4	1	Graduate job placement is very good.
8	2.2	10	26	14	2	0	Graduate career opportunities are very good.
9	2.5	1	27	19	5	0	Graduate starting salaries are very good.
10	2.3	7	25	17	1	0	Salary growth potential in this field is excellent.
11	1.7	17	28	6	0	0	Electrical/Electronics technology will continue its rapid growth.
12	2.2	8	28	13	1	1	Ferris State's BSEET degree will provide a solid foundation for your career.
13	2.4	3	26	16	3	0	Ferris State's BSEET program has a good reputation in industry.
14	2.4	9	22	17	7	0	The Department administration is helpful and courteous.
15	2.5	5	17	27	3	0	There are adequate career planning and placement services available.
16	2.3	8	29	11	3	0	When entering the EET program at Ferris, you were placed at the appropriate educational level.
17	2.0	13	31	8	2	1	EET department instructors are knowledgeable

							in their field.
18	2.2	6	35	11	1	2	EET department instructors are current in their field.
19	2.2	7	33	11	3	1	EET department instructors make themselves available outside classroom hours .
20	2.3	9	28	13	3	2	EET department instructors are helpful and courteous.
21	2.7	3	22	19	9	2	EET classroom instruction quality is good.
22	2.1	9	30	15	0	1	EET courses are challenging and informative.
23	2.6	1	24	21	3	2	EET courses lay a good foundation for follow-up courses.
24	2.7	1	26	19	6	2	EET course topics cover your areas of interest.
25	2.8	1	18	26	8	2	EET text books are of good technical quality.
26	2.5	5	28	15	4	3	EET laboratory work reinforces lecture material.
27	2.3	8	26	14	6	0	EET curriculum develops critical thinking skills (i.e. analytical and problem solving abilities).
28	2.8	2	26	12	11	4	Laboratory facilities are of good quality.
29	3.0	1	15	24	10	4	Laboratory equipment is current with industry.
30	2.9	1	21	22	7	3	Laboratory equipment is generally well maintained.
31	2.8	3	18	20	11	3	Laboratory equipment is available in adequate quantity.
32	2.1	12	33	7	1	2	Computers in the department are current with technology.
33	2.4	6	30	12	4	2	Computer tools are integrated into courses.
34	2.1	9	35	8	3	0	Computers and software are accessible during laboratory hours.
35	2.8	4	24	13	8	6	Computers and software are accessible outside of laboratory hours (late labs, network access, etc.).
36	3.2	1	9	23	15	4	Computer support services are available when I need them (tutoring, after hours assistance, etc.).
37	3.2	0	15	21	10	6	Technical Science electives are available for my interests.
38	2.9	0	16	23	5	3	Technical Science instruction is of good quality.
39	2.6	6	13	15	6	3	Math course material is relevant to the BSEET program.
40	2.6	5	21	18	6	2	Math instruction is of good quality.
41	2.7	6	15	17	7	3	Physics course material is relevant to the BSEET program.
42	2.9	3	13	19	5	5	Physics instruction is of good quality.
43	2.9	1	15	28	5	3	General Education courses provide a more rounded education that better prepares me for the workplace.
44	2.6	3	19	26	2	1	General Education instruction is of good quality.
45	2.6	5	18	19	5	1	Student professional societies (i.e. IEEE) benefit me.
46	2.4	3	19	26	0	2	BSEET program/instructors/societies promote student camaraderie.
47	2.3	5	32	11	2	2	The BSEET program provides quality education.

Results First and Second Year Students

Resulting Average = 2.3

Average : 1.0 - 2.0 EXCELLENT (Strongly Agree)
 2.1 - 3.0 GOOD (Agree)
 3.1 - 4 FAIR (Somewhat Agree)
 4.1 - 5 POOR (Disagree)

Surveys processed: 30 (11 Second Year and 19 First Year)

Q#	Avg	1	2	3	4	5	
1		16	14				Indicate your academic status
2		<ul style="list-style-type: none"> • First Year = 24 • Second Year = 4 • Third Year = 1 • Fourth Year = 					Indicate your academic status when you began at, or transferred into the EET Program at Ferris.
3		<ul style="list-style-type: none"> • Design Engineering = 8 • Engineering Support and Applications = 9 • Technician = 11 • Management = 0 • Other = 1 					Indicate your prime career interest.
4		<ul style="list-style-type: none"> • Communications = 3 • Computers/Digital = 12 • Industrial Automation = 11 • Education = 0 • Other = 2 					Indicate your prime field of interest.
5		<ul style="list-style-type: none"> • Yes = 20 • No = 2 • Unsure = 7 					Do you expect to complete your BSEET Degree at Ferris State
6		<ul style="list-style-type: none"> • Masters in Engineering or Technology = 7 • Business/Management Degree = 0 • Additional Bachelor Degrees in Engineering/Computers/Technology = 9 • Other = 2 • I will not pursue additional formal education = 10 					Indicate your desire for education after the BSEET.
		1 Strongly Agree	2 Agree	3 Somewhat Agree	4 Disagree	5 Strongly Disagree	
7	2.0	8	13	4	0	1	Graduate job placement is very good.
8	2.0	8	13	5	0	1	Graduate career opportunities are very good.
9	2.2	5	13	8	0	1	Graduate starting salaries are very good.
10	1.9	9	14	3	0	1	Salary growth potential in this field is excellent.
11	1.7	11	16	3	0	0	Electrical/Electronics technology will continue its rapid growth.
12	2.1	5	18	5	1	0	Ferris State's BSEET degree will provide a solid foundation for your career.
13	2.2	3	17	7	0	1	Ferris State's BSEET program has a good reputation in industry.
14	2.1	6	16	5	2	0	The Department administration is helpful and courteous.
15	2.5	4	9	10	1	2	There are adequate career planning and placement services available.
16	2.3	8	13	4	3	2	When entering the EET program at Ferris, you were placed at the appropriate educational level.
17	2.1	9	13	6	1	1	EET department instructors are knowledgeable

							in their field.
18	2.2	6	15	5	2	1	EET department instructors are current in their field.
19	2.2	5	17	6	1	1	EET department instructors make themselves available outside classroom hours .
20	2.7	3	12	8	4	2	EET department instructors are helpful and courteous.
21	2.8	3	8	13	5	1	EET classroom instruction quality is good.
22	2.0	5	20	5	0	0	EET courses are challenging and informative.
23	2.2	2	16	8	0	0	EET courses lay a good foundation for follow-up courses.
24	2.3	5	14	8	2	1	EET course topics cover your areas of interest.
25	2.7	4	8	10	6	1	EET text books are of good technical quality.
26	2.3	7	12	6	1	3	EET laboratory work reinforces lecture material.
27	1.8	9	17	3	0	0	EET curriculum develops critical thinking skills (i.e. analytical and problem solving abilities).
28	2.5	3	14	10	2	1	Laboratory facilities are of good quality.
29	2.4	3	12	9	3	0	Laboratory equipment is current with industry.
30	2.4	3	14	3	3	1	Laboratory equipment is generally well maintained.
31	2.3	4	15	10	0	1	Laboratory equipment is available in adequate quantity.
32	2.5	6	10	8	3	2	Computers in the department are current with technology.
33	2.2	6	11	11	1	0	Computer tools are integrated into courses.
34	2.0	7	15	7	0	0	Computers and software are accessible during laboratory hours.
35	2.2	7	9	11	1	0	Computers and software are accessible outside of laboratory hours (late labs, network access, etc.).
36	2.6	2	9	13	2	0	Computer support services are available when I need them (tutoring, after hours assistance, etc.).
37	2.7	2	8	10	2	1	Technical Science electives are available for my interests.
38	2.4	1	10	6	2	0	Technical Science instruction is of good quality.
39	1.8	14	8	4	1	1	Math course material is relevant to the BSEET program.
40	2.3	8	11	5	3	2	Math instruction is of good quality.
41	2.4	4	6	2	2	1	Physics course material is relevant to the BSEET program.
42	2.4	2	7	4	0	1	Physics instruction is of good quality.
43	2.7	3	11	6	6	3	General Education courses provide a more rounded education that better prepares me for the workplace.
44	2.6	1	13	10	3	1	General Education instruction is of good quality.
45	3.1	0	7	7	4	2	Student professional societies (i.e. IEEE) benefit me.
46	2.6	3	8	9	3	1	BSEET program/instructors/societies promote student camaraderie.
47	2.2	4	17	7	1	0	The BSEET program provides quality education.

SECTION 5
FACULTY PERCEPTIONS OF PROGRAM

The enclosed Faculty Perceptions of the Program questionnaire was given to each faculty member along with a blank scantron sheet. Each faculty member completed the questionnaire and returned it to the committee. Responses were anonymous. There were no difficulties encountered in distributing and collecting the surveys. Percent of respondents was 100%.

Summary of Results

The summary of overall response of the employer revealed the following conclusions:

1. **It is not beneficial to have one instructor teach lecture and another teach lab for the same course. (Question 4)**
2. **The operating and capital improvements budgets for the department are inadequate. (Question 7&8)**
3. **Course prerequisites are not adequately enforced. (Question 9)**
4. **Faculty development funds are inadequate. (Question 11)**
5. **Release time for faculty and course development is inadequate. (Question 12,13,53)**
6. **Incoming students are not academically or socially prepared for the curriculum. (Question 21&22)**
7. **There are not enough remedial or structured learning assistance courses offered in BSEET program for students of low preparedness. (Question 23&24)**
8. **Scheduling labs so that students work individually would strengthen our program. (Question 14)**
9. **Existing faculty credentials and work experience are appropriate for the job. (Question 48,49,50,54,55)**
10. **The curriculum does not require any major changes. (Question 41,42,43,45,46,47)**

**Survey Sample
Program Review
BSEET
Faculty Perceptions of the Program**

Rev. 11-28-95

Directions:

Use a #2 pencil.

Fill in the Scantron answer sheet indicating to what degree you agree with the following statements.

Consider all 4 years of the BSEET program.

Strongly Disagree	Neutral	Strongly Agree
1 2	3	4 5
O O	O	O O

The Administration:

1. Scheduling of courses is done at appropriate times of the day.
2. Scheduling of courses is done in appropriate rooms and labs.
3. The appropriate instructors are assigned to courses.
4. It is beneficial to have one instructor teach lecture and another teach lab for the same course.
5. Lecture class sizes are appropriate for facilities.
6. Lab class sizes are appropriate for facilities.
7. The operating budget for the department is adequate.
8. Our department gets its fair share of capital improvement moneys.
9. Course prerequisites are adequately enforced.
10. Faculty receive adequate support in dealing with student complaints.
11. Adequate funds are allocated for faculty development.
12. Adequate provisions are made for release time for faculty development.
13. Adequate provisions are made for release time for course development.
14. Our program would be strengthened by scheduling labs so the students work individually.
15. Adequate secretarial support is provided.
16. Adequate technical support is provided.
17. The Administration is technically competent to manage the curriculum.
18. The Administration considers teaching the most important aspect of my job.
19. The Administration spends their time on things important to the program.
20. The Administration allows the faculty to specialize in specific areas of the curriculum.

On a separate sheet of paper, list any comments you have concerning the Administration of this program.

Strongly Disagree		Neutral	Strongly Agree	
1	2	3	4	5
0	0	0	0	0

The Students:

21. Incoming students are academically prepared for the curriculum.
22. The incoming students are socially prepared to accept the responsibilities of college life.
23. Adequate remedial electrical courses are offered for students of low preparedness.
24. EEET Structured Learning Assistance (SLA) should be offered for the entry level courses.
25. Incoming students possess a good work ethic.
26. The students are aware of tutoring opportunities available to them.
27. The students take advantage of tutoring opportunities available to them.
28. The BSEET graduates have attained an appropriate level of maturity and competence.
29. The EEET students are active participants in curricular and extra-curricular activities.
30. The EEET graduates leave with strong critical thinking skills.
31. The EEET graduates leave with a sense of professional identity.

On a separate sheet of paper, list any comments you have concerning the Students of this program.

The Facilities, Equipment, and Materials:

32. The facilities are kept neat and clean.
33. The facilities present a good image to students and visitors.
34. The lecture rooms are adequate for the number of students scheduled.
35. The lab equipment is adequate for the number of students scheduled.
36. Instructional materials and supplies are adequately provided.
37. Instructional equipment is adequately provided and maintained.
38. The laboratory equipment has been historically well-maintained.
39. The type of laboratory equipment is adequate for the curriculum.
40. The computer network has been historically well-maintained.

On a separate sheet of paper, list any comments you have concerning the Facilities of this program.

Strongly Disagree		Neutral	Strongly Agree	
1	2	3	4	5
0	0	0	0	0

The Curriculum:

41. The curriculum provides the right mix of EEET courses.
42. The academic level of the curriculum is appropriated to the program's mission.
43. There is adequate continuity among courses.
44. The curriculum needs a path for students who progress at a slower pace.
45. The curriculum provides adequate choices of specialization.
46. The curriculum is relevant to the needs of employers.
47. The curriculum enables its graduates to be "self-learners".

On a separate sheet of paper, list any comments you have concerning the Curriculum of this program.

The Faculty:

48. The faculty are technically competent.
49. The faculty know how to teach.
50. The faculty are well prepared for class.
51. The faculty are concerned with the needs of the students.
52. The faculty spend an appropriate amount of time in committees.
53. The faculty are encouraged to stay current in their field.
54. The faculty are current in their field.
55. The faculty have had adequate work experience.
56. The academic education of the faculty is appropriate for the job.

On a separate sheet of paper, list any comments you have concerning the Faculty of this program.

Strongly Disagree		Neutral	Strongly Agree	
1	2	3	4	5
0	0	0	0	0

Advisory Committee:

57. The Advisory Committee meets often enough.
58. The Advisory Committee is knowledgeable about the program.
59. The Advisory Committee is supportive of the program.
60. The Advisory Committee consists of the appropriate mix of people.
61. The Advisory Committee is adequately utilized by the program.
62. Suggestions from the Advisory Committee are encouraged.
63. The Advisory Committee meetings are run in a professional, efficient manner.

On a separate sheet of paper, list any comments you have concerning the Advisory Committee of this program.

Alumni:

64. The EEET alumni express a loyalty to the program.
65. The department maintains good communications with the alumni.

On a separate sheet of paper, list any comments you have concerning the Alumni of this program.

Analysis of Data:

Below are listed the statements that the faculty **disagreed** with as indicated by a mean score of **less than 2.5**. The number to the left of each statement is the statement number on the original questionnaire.

	Strongly Disagree		Neutral	Strongly Agree			
	1	2	3	4	5		
	0	0	0	0	0		
<u>Statement</u>						<u>Mean</u>	<u>% Respondents who Disagree or Strongly Disagree</u>
4. It is beneficial to have one instructor teach lecture and another teach lab for the same course.						2.2	66.7%
7. The operating budget for the department is adequate.						1.8	66.7%
8. Our department gets its fair share of capital improvement moneys.						2.0	77.8%
9. Course prerequisites are adequately enforced.						2.2	55.5%
11. Adequate funds are allocated for faculty development.						1.9	66.6%
12. Adequate provisions are made for release time for faculty development.						2.2	55.5%
13. Adequate provisions are made for release time for course development.						2.0	66.6%
21. Incoming students are academically prepared for the curriculum.						1.9	88.9%
22. The incoming students are socially prepared to accept the responsibilities of college life.						2.0	66.6%
23. Adequate remedial electrical courses are offered for students of low preparedness.						2.0	88.9%
25. Incoming students possess a good work ethic.						1.9	77.7%

27. The students take advantage of tutoring opportunities available to them.	2.2	55.5%
53. The faculty are encouraged to stay current in their field.	2.4	55.5%

Below are listed the statements that the faculty **agreed** with as indicated by a mean score of **greater than 3.5**. The number to the left of each statement is the statement number on the original questionnaire.

	Strongly Disagree		Neutral	Strongly Agree	
	1	2	3	4	5
	0	0	0	0	0
<u>Statement</u>					<u>Mean</u> <u>% Respondents who Agree (4) or Strongly Agree (5)</u>
14. Our program would be strengthened by scheduling labs so the students work individually.					3.8 55.5%
24. EEET Structured Learning Assistance (SLA) should be offered for the entry level courses.					4.0 88.9%
41 The curriculum provides the right mix of EEET courses.					4.1 77.7%
42. The academic level of the curriculum is appropriated to the program's mission.					3.6 55.5%
43. There is adequate continuity among courses.					3.8 77.8%
45. The curriculum provides adequate choices of specialization.					3.8 77.8%
46. The curriculum is relevant to the needs of employers.					3.9 77.8%

47. The curriculum enables its graduates to be "self-learners".	3.6	66.7%
48. The faculty are technically competent.	3.9	77.8%
49. The faculty know how to teach.	3.8	77.8%
50. The faculty are well prepared for class.	4.0	88.9%
51. The faculty are concerned with the needs of the students.	4.1	88.9%
54. The faculty are current in their field.	3.6	66.7%
55. The faculty have had adequate work experience.	4.0	77.7%
62. Suggestions from the Advisory Committee are encouraged.	3.7	66.7%

SECTION 6
ADVISORY COMMITTEE PERCEPTIONS OF PROGRAM

The Program Review Panel (PRP) designed a survey to determine the advisory committees perceptions of the BSEET program. A sample survey form is attached. Statements address program content and quality, instructional equipment, facilities, and placement. Program advisors were given the survey to complete. Eight responses were received out of the 12 possible. (Percent response was 67%) There was some difficulty in obtaining these surveys because of the short time allowed.

Summary of Results

The overall response of the advisory committee survey demonstrates:

1. **The average rating for each survey statement fell between good and excellent . (4 - 5).**
2. **Program content and quality are based on performance objectives. The objectives represent job skills and knowledge required for successful entry level employment.**
3. **Program content and quality are designed to provide students with practical job application experience.**

Survey Sample and Results

FERRIS STATE UNIVERSITY
 COLLEGE OF TECHNOLOGY
 ELECTRICAL/ELECTRONICS DEPARTMENT
 Bachelor of Science in
 Electrical/Electronics Engineering Technology Program

GRADUATE EVALUATION FORM FOR SUPERVISOR

1. How long have you known this graduate?

- Less than six months (About how many months? _____)
2 (1 month) 2 (2 months) 3 (3 months) 3 (4 months)
1 (5 months)
- Six months to a year
2
- One to two years
6
- More than two years
2
 Self Employed
1

2. How would you rate this employee with respect to the following characteristics, in comparison with other baccalaureate E.T.'s you know and/or supervise? (Check one in each line. If you feel that you simply have no basis for making a judgment concerning a particular characteristic listed, please check the "unknown" column and leave that rating blank.)

	Unknown 0	Very Low 1	Below Avg 2	Avg 3	Above Avg 4	Very High 5	MEAN SCORE
a. Commitment to engineering technology				6	21	1	3.8
b. Knowledge of engineering theory	2			12	11	3	3.6
c. Knowledge of engineering application	1			9	15	3	3.8
d. Ability to perform assigned tasks			1		17	9	4.3

e.	Motivation, initiative			1	4	13	10	4.1
f.	Sound judgment				9	15	4	3.8
g.	Makes workable suggestions		1		6	19	3	3.7
h.	Communication skills		1	1	10	12	5	3.6
i.	Problem-solving ability	1	1		9	12	5	3.7
j.	Self-esteem, self-confidence	1	1	1	5	12	9	4
k.	Responsibility				9	8	11	4.1
l.	Sensitivity, concern for others	1			6	17	3	3.9
m.	Leadership skills	5		1	12	9	1	3.4
n.	Decision making skills.	1		1	11	12	2	3.6
o.	Problem assessment skills	1		1	6	16	5	3.9

3. Overall, how would you rate this graduate in comparison with other baccalaureate E.T.'s you have known and/or supervised? (Please circle one of the X's.)

X	X	X	X	X	X	X	X
Very Low	Low-----Average-----High			Very High			
Number of respondents	1	4	10	10	2		

Additional Comments:

Due to the short time frame in which I've had the opportunity to get to know and assess the skills of, this candidate, I believe these scores will change as my familiarity increases.

Has problem with attention to details. Appears to be getting better.

The environment we are working in is robotics for die cast industry. I have no other ET's to compare. Previous experience with ET's was in the computer industry.

Has progressed very rapidly in the 2+ months he has been with us. He became a valued team member very rapidly. He does an exceptional job of applying the theory he has learned to practical applications. If you have more students like him we would be glad to add them to our team.

Mechanical and electrical backgrounds were very helpful in performing his assigned tasks. He was professional in both attitude and work habits. I enjoyed working with him.

Another very positive experience with the internship program.

Our summer intern is a hard worker who is ambitious, and willing to learn. I believe that he has a great future ahead of him.

We enjoyed having him here. It was great to have someone with such technical ability in this position.

Great attitude. Good team player.

Performs well above entry level expectations. He has a solid theoretical base and can apply theory to practice. I rank him above 95% of the entry level ET's I've hired in the past 25 years.

I know nor supervise any other ET's. Therefore, my judgement based on experience with other engineering graduate. Assessment may be more critical than necessary.

Is a pleasure to have as an employee. He is very well rounded in problem solving of any system and has a good sense of troubleshooting procedures. He also works very well with the plant environment personnel.

Is a very professional engineer. His skills in Engineering are high and his interpersonal skills are above average. I expect him to continue to advance as an engineer.

The writer and his fellow controls engineers at the Van Dike Plant appreciate his dedication and contributions to the success of our section.

Since I'm self employed, I didn't do a self evaluate. It would be too biased. Group Five Co. supplies duplicated video cassettes and materials for 150 companies in the mid-west. We have been in business since '85.

Thank you for your cooperation. Please return this form to:

Ferris State University
Electrical/Electronics Department
405 Swan Building
915 Campus Drive
Big Rapids, MI 49307-2291

Survey Results
BSEET Program Advisory Committee Evaluation
Perceptions of the BSEET Program (N=8)

Mean Score
 Poor to Excellent
 1 to 5

Instructional program content and quality are:

Based on performance objectives that represent job skills and knowledge required for successful entry level employment. 4.9

Designed to provide students with practical job application experience. 4.8

Responsive to non-traditional-working persons. 4.5

Periodically reviewed and revised to keep current with changing job practices and technology. 4.4

Provides foundation for career growth and continued education. 4.5

Instructional Equipment:

Current and representative of that used on the job. 4.1

Instructional Facilities:

Provide adequate lighting, ventilation, heating, power, and other utilities. 4.5

Placement:

Job opportunities exist for students completing the program or leaving with marketable skills. 4.5

Advisory Committee Input

The program utilizes the expertise of the committee members. 4.1

Written Comments:

Would like to see CAD application encouraged in more courses.
 Student's expectations are a little low. Four year grads sometimes act like techs.
 Should be more current scopes. Very old in some areas.
 All labs should be air conditioned

SECTION 7
LABOR MARKET ANALYSIS

The BSEET graduates have enjoyed excellent placement each year since the first group crossed the stage in 1986. The 1995 grads found excellent positions at starting salaries of \$32,000 to \$42,000 (these figures are from actual accounts of graduates communicating with faculty and staff of the E/E Department). According to the Collegiate Employment Research Institute of East Lansing, Michigan, the starting salary for 1995-96 graduates of Electrical Engineering is predicted to be \$36,706. Electrical Engineering is ranked 3rd after Chemical and Mechanical Engineering.

Summary of Results

The Labor Market Analysis demonstrates:

1. **Advertisements in local papers reflect strong demand for electronics graduates.**
2. **Our BSEET graduates are hired with Engineering titles.**
3. **Electrical/Electronic Engineer Positions are expected to increase faster than the average for all occupations through 2005. This information is taken from the 1995 Michigan Occupational Information System**
4. **The Ferris State Placement Bulletin contains approximately 60 listings in the first four months of the 95-96 academic year for electronic graduates. A small percentage of those ads were for two year grads, but, the majority were for the BSEET graduate.**
5. **There will be a continued demand for BSEET graduates. There is rapid expansion of the application of micro-processors and microcontrollers, satellite television, cellular phones, Programmable Logic Controllers, and PC applications.**
6. **Electrical/Electronics Engineering is rated as the nineteenth out of the 50 top occupations for the next 5 - 10 years. Refer to the April 1993 Money Magazine Special Report: "Where to Get the Best Jobs".**

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Human Resources Mgr.

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1230 Eisenhower Place
Ann Arbor, MI 48108
Fax: (313) 973-3268

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Plan, conduct and lead engineering projects from conception and proposal through completion of qualification testing and production buy off. Create new designs. Oversee their development from prototype verification testing through release to production. Manage programs to assure all technical requirements and cost goals are met. Provide guidance and direction to other engineers, technicians and design/drafting personnel.

Qualifications include a BSME or equivalent degree and 5-10 years experience in the design and development of reflector/optical systems for aircraft interior/exterior lighting equipment. *Please refer to position code SLE.*

Project Engineer

Plan, conduct and lead engineering projects from conception and proposal through completion of qualification testing. Oversee production and prototypes for vision and electromechanical products, such as interior, exterior static lighting systems, and support equipment (including fluorescent ballasts, electronic dimmers, strobe power supplies, etc.). Manage programs to assure technical requirements and cost goals are met. Provide guidance and direction to technicians and design/drafting personnel.

Qualifications include a BSEE or equivalent degree and 5-10 years experience in the design and development of lighting aircraft components. Should be familiar with military specifications and FAA regulations. *Refer to position code PE.*

**Electro-Mechanical
Project Engineer
Sr. Electro-Mechanical
Project Engineer**

Utilizing advanced technical capabilities, these individuals will be responsible for the design and development of electro-mechanical devices (retractable landing lights, windshield wiper systems for aircraft), from proposal through qualification and support of production. Projects will emphasize design of mechanisms and gear assemblies, and selection and application of fractional horsepower motors and position sensors. These project engineers will apply analytical and technical skills including assembly design, solid modeling, stress and dynamic analysis (including FEA), and material and component parts selection.

These positions require a BS (MS a plus) in Mechanical or Electrical Engineering with experience in a technical, integrated product team and TQ environment. Applicants must be innovative, demonstrate effective leadership and project management abilities, and possess strong analytical and communication skills. *Please refer to position code EME.*

We offer a competitive salary and excellent benefits including a company-matched 401(k) plan. To apply, please send a resume of your qualifications to: Human Resources Dept., Position Code ____, Grimes Aerospace Company, P.O. Box 247, Urbana, OH 43078. Equal opportunity employer, M/F/D/V.





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TECHNICAL WRITER

Prepare, edit and compile technical service manuals for machine tools, including transfer lines, assembly machines, welding machines, and special purpose machines. Prepare documentation and other materials for customer training. Requirements include minimum of Associate's Degree; proven technical documentation preparation, preferably with emphasis in machine tools; excellent communication skills; PC experience in WORD and EXCEL; basic understanding of electronic concepts and terminology.

TRAINING DIRECTOR

Prepare and conduct customer training for machine tools, including transfer lines, assembly machines, welding machines and special purpose machines. You will define and develop training materials and outline suitable for product line, coordinate scheduling and customer requirements, organize and maintain customer specifications, and supervise technical writing.

Requirements include a Bachelor's Degree in communication, journalism or related field, demonstrated ability to make oral presentations to technical personnel, experience in machine tool or related environment, basic understanding of mechanical and electrical engineering concepts, and excellent interpersonal skills.

MECHANICAL ENGINEER

You will develop machine design concepts, design sub-assemblies, and coordinate engineering drawing development in compliance with standards and specifications. Responsibilities will also include interface with manufacturing to implement the design on the shop floor, provide, monitor and update design schedule as needed, with focus on reliability and maintainability, providing design improvement recommendations as necessary.

B.S.M.E. required, with experience in AutoCAD.

PROJECT ENGINEER (MECHANICAL) ASSEMBLY AND TEST

You will have lead engineer responsibility for assembly and test product line, liaising with customer on engineering issues, supporting manufacturing during installation.

B.S.M.E. required, a minimum of five years experience in assembly and test engineering, and strong project management skills.

PROPOSAL/ESTIMATING ENGINEER

In support of assembly and test product line, you will set up PC based estimating system, estimate and construct proposals, and liaise with customer.

Bachelor's Degree preferred. Requirements include detailed engineering knowledge of assembly equipment, PC literacy with emphasis in advanced spreadsheets. German language skills helpful.

ESTIMATOR

Compile estimates of cost as a basis for pricing welding/automation equipment.

Must have engineering knowledge and ability to interpret engineering layouts and data. Requires extensive knowledge of designs, manufacturing processes and procedures with direct experience in welding/automation equipment. Minimum five years experience required, with PC literacy using Excel software.

PROJECT ENGINEER (MECHANICAL) WELDING/AUTOMATION

You will have lead engineering responsibility for welding/automation product line, liaising with customer on engineering issues, supporting manufacturing during installation.

B.S.M.E. preferred, with a minimum of five years experience in welding/automation systems engineering, and strong project management skills.

ELECTRICAL ENGINEER

Design electrical hardware, power, control interfacing diagrams and electrical enclosures/layouts using various supplier equipment PLC, CNC, servo drives and discrete components to customer based requirements and mechanical design constraints. Generate CAD hardware documentation and releases of equipment procurement.

Design software interfacing of various suppliers equipment PLC, CNC, motion controls, networks communications, MIS and operator user workstations per requirements of processes defined for total system integration. Simulation testing and commissioning systems for actualization of startup/debug of systems.

B.S.E.E. required.

CAD DESIGNER

Develop documents utilizing electrical/fluid standards and other enhanced software tools as defined by engineering. Assist engineering with electrical and fluid design documentation, job equipment releases, and documentation packaging and shipping.

AutoCAD experience required.

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ENGINEER-AUTHOR

to develop automotive electrical circuits from engineering documentation. Basic understanding of DC circuitry required. Automotive knowledge preferred. AutoCAD experience a plus. Send resume and salary requirements to: VFTC-KRM, 21455 Melrose, Suite 18, Southfield, MI 48075. EOE.

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3-5 years experience with PLC, Beckwith and 401K. Pay based on exp. Send resume to: F.O. Box 46740 MI, Clemens, MI 48066

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Machine design/automation/integration CAD & PLC exp. required. Competitive salary, exc bonus plan. Send resume & salary history to: **No. Ky. Engineering Inc.** 7595 River Rd. Hebron, Ky. 41048

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We seek an accomplished professional to help generate functional and design specifications for our computer based automation controls, provide training for other software engineers, and provide ideas for future development. You will also assist in planning and software implementation of future controls development projects and implement sold order projects as required. The qualified candidate will have a solid working knowledge of the "C" programming language and expertise in as many of the following categories as possible; real time operating systems, network management and other connectivity issues, database management, and Windows-based Graphical User Interface. In support of sales, some customer contact and travel will be required.

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A Lansing based Tier One automotive supplier has an immediate opening for a Project Engineer. The successful candidate will have a minimum associates degree in engineering or technical program. 5 years experience in project planning and implementation. Must have working knowledge of machine controls, project planning software, and synchronous manufacturing. Prefer experience in high volume automotive manufacturing environment. Qualified candidates submit resume with salary history to:

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 P.O. Box 20217
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0-7 years exp. auto driveline components, BSME w/interest in fluid dynamics or tribology. Excellent communication/report writing skills a must. Familiarity with IBM software, AutoCad, and FEA a plus. EOE. P.O. Box 361, Utica, MI 48317.

AUTOCAD DETAILER
 Control systems, Electrical and fluids. 3 yrs. experience minimum. Will train for design. Fax resume: 810-757-7477

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ELECTRICAL ENGINEER

Greiner Inc., one of the Great Lakes area's recognized leaders in the A/E industry has immediate openings for an Electrical Engineer in our Grand Rapids and Farmington Hills offices. We are looking for a person who has ten years experience in power engineering and is capable of design of utilities, substations, education, health care, and industrial facilities. Professional registration preferred. If you want to be part of a team of professionals committed to excellence, contact: Dale R. Berglund, Greiner, Inc., 3950 Sparks Drive Southeast, Grand Rapids, MI 49546, 616-285-3530. E.O.E. - F/M/H/V

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Eng.-BSCE Min. 5 yrs. exp.
 in automotive design/development of electrical components/systems, wire harness, quality R.D. Salaried position. S.E. Mich. Contact
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with 5 years experience in industrial controls design and start-up. Gas and electric heating controls, PLC, and ACAD experience preferred. Competitive salary and benefits offered. Send resume to: Engineering Manager, P.O. Box 40234, Redford, MI 48239.

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Laser Alignment, a manufacturer of laser measurement and machine control systems seeks an experienced electrical engineer for the machine control group of our research & development department. EE degree, minimum 2 yrs experience, strong capability with both hardware and microprocessor software required. Knowledge of Intel based microprocessors and the construction industry a plus. We offer excellent compensation and a fully paid benefit program. Please send resume to:

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ELECTRICAL ENGINEER - Greiner, Inc. one of the Great Lakes area's recognized leaders in the A/E industry, has an immediate opening for an electrical engineer in our Grand Rapids, and Farmington Hills offices. We are looking for a person who has 10 yrs experience in power engineering and is capable of utilities, substations, and design of education, healthcare, and industrial facilities. Degree in electrical engineering required. Professional registration preferred. If you want to be part of a team of professionals, committed to excellence, contact Dale R. Berglund, Greiner, Inc., 3950 Sparks Dr. SE, Grand Rapids, MI 49546. Phone 616-285-3530. EOE/M/F/V/H.

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WHERE TO GET THE BEST JOBS

BY JERSEY GILBERT

Susan Laubert's career path shows the benefits of being in the right place and the right field. Over the past 12 years, Laubert (pictured below), a computer systems analyst, has seen four jobs disappear in corporate downsizings and merger-related cutbacks. But while her employers were pushing people down and out, she was moving onward and upward—always securing a new position, with a raise, before she was through the door of the company she was leaving. The latest entry on her résumé: RMS Technologies in Landover, Md., where she supervises the analysts who run the software that processes data from NASA's Upper Atmosphere Research Satellite.

What's her secret? For one thing, as a computer analyst, Laubert, 44, is in the field that tops the Bureau of Labor Statistics list of the fastest-growing white-collar jobs. Demand for systems analysts remained strong throughout the recession,

Susan Laubert's computer skills are always in demand.



even at many companies that were laying off other workers. And BLS forecasts that 366,000 positions for these specialists will become available by 2005, a 79% increase from 1990.

What's more, Laubert is lucky enough to be plying her trade in the Washington, D.C. area, the nation's hottest job market. The capital region grew steadily during the 1980s and will add another 118,000 jobs by 1995, more than any other metropolitan area. Government spending acts as a magnet for everything from corporate lobbyists and law firms to data processors and telecommunications consultants.

People who want to plant their careers in similarly fertile soil should consult the two big tables that follow. On pages 170 and 171, MONEY

identifies the 50 managerial and professional occupations that will produce the most new jobs by year 2005. Such service careers as computing, health care, teaching, counseling and management dominate our rankings—and no wonder, since the service sector is expected to account for nearly 19 of every 20 new jobs over the next 12 years. On pages 172 and 173, we name the metropolitan areas with the most promising employment outlooks; most big cities failed to make that list.

Economists point to two encouraging developments for job seekers. Service sector wages will continue to rise, thanks mainly to improvements in office technology that let each person accomplish more. And competition for jobs will ease a bit. The annual increase in the number of people looking for work will slow from the 2% or 3% of the postwar period recent years to just 1.3% as the baby-bust generation enters the labor force. Happy hunting!

In computing and health care, and in the nation's capital—that's where.

THE 50 TOP OCCUPATIONS

Here are the jobs with the brightest prospects.

The best job opportunities belong to analysts (of computers and organizations) or therapists (for minds and bodies), according to our exclusive ranking of the 50 occupations that will show the greatest percentage employment gains by 2005.

We surveyed professional and managerial fields that generally require at least a college degree; we excluded such jobs as secretary and security guard and trades like plumbing.

The figures in the first three columns at right will give you a sense of what you can expect to earn pursuing each career. They are based on data from the Economic Research Institute, a compensation specialist in Newport Beach, Calif. The starting salary is an average of what people are generally paid in their first year. The median salary is at dead center: Half the people in the field make more than that, half make less. The typical top salaries reflect the wages that someone would receive after eight to 12 years of service in that position. All these figures are based on national samples; there are considerable differences from region to region.

In the fifth column, you will find the ratio of men and women pursuing each career, as reported in the most recent Census. Despite the gains made by women over the past decade, striking imbalances remain in such male-dominated fields as engineering and architecture.

	Career (% increase expected by 2005)	Starting salary	Median salary	Typical top salary	Ratio of men to women	Tips and comments
1	Computer systems analyst (79)	\$27,788	\$38,821	\$52,462	66/34	Those who understand how organizations work are in greatest demand.
2	Physical therapist (76)	19,168	25,807	34,375	22/78	Private practices are creating opportunities outside of hospitals and institutions.
3	Operations analyst (73)	20,521	29,654	50,047	57/43	Railroads and airlines are among the biggest employers.
4	Psychologist (64)	28,007	39,607	84,069	41/59	Worker training and computerized learning are hot specialties.
5	Travel agent (62)	14,250	23,817	37,563	40/60	Agencies that specialize in cruise bookings are expanding.
6	Computer programmer (56)	20,120	30,806	51,918	68/32	Businesses need programmers familiar with local area network technology.
7	Occupational therapist (55)	25,800	29,284	38,750	10/90	Experience treating back and repetitive motion injuries is valuable.
8	Management analyst (52)	18,147	30,992	110,600 ^a	69/31	Many of these consultants serve as expert witnesses in business litigation.
9	Respiratory therapist (52)	27,614 ²	34,344	44,952	40/60	With gerontology experience you'll breathe easier about your future.
10	Marketing, advertising or p.r. manager (47)	23,261 ³	39,190	76,638	69/31	Having a thorough understanding of product development will promote your career.
11	Hotel manager or assistant manager (44)	32,283 ⁴	55,438	80,934	76/24	An ability to deal with benefits and personnel is a fast way in.
12	Registered nurse (44)	28,773	31,463	62,488	5/95	Nurses are needed at outpatient facilities and to treat patients at home.
13	Health services manager (42)	45,723	51,677	91,381	33/67	Medical groups and clinics are looking for people with marketing skills.
14	Broker/financial service representative (40)	26,269 ⁵	27,432	42,770	71/29	Financial firms need people to sell retirement savings plans to employers.
15	Accountant (34)	20,366	30,314	50,765	48/52	Women now represent more than half the profession.
16	Biologist (34)	21,221	33,485	56,503	58/42	Funding for AIDS studies has created renewed demand for biomedical researchers.
17	Counselor (34)	13,365	18,869	34,962	39/61	In 38 states and D.C., drug, family and other counselors must now be licensed.
18	Data processing manager ¹ (34)	26,752	45,938	87,066	80/20	Develop a specialty such as data-base management or telecommunications.
19	Electrical/electronic engineer (34)	26,047 ⁶	41,896	68,768	91/9	Designers of microprocessors for artificial intelligence applications are in demand.
20	Lawyer (34)	31,632 ⁷	51,111	121,718	81/19	The President, his wife and most of the Cabinet are lawyers.
21	Physician (34)	60,78 ⁸	110,573	266,220	80/20	Family practitioners will find it easier to start careers in HMOs or rural practices.
22	Pilot (34)	21,845	33,887	62,835	97/3	Two years as a flight instructor helps you qualify for high-paying airline positions.
23	Property manager (34)	30,676	51,684	74,697	54/46	Employers prefer that you have real estate sales experience as well as a college degree.
24	Secondary school teacher (34)	18,768	28,737	49,104	45/55	Mainstreaming of special-ed students makes special-ed training a plus.
25	Social worker (34)	13,797	17,943	33,169	31/69	Rural areas continue to need more of these professionals.

	Career (% increase expected by 2005)	Starting salary	Median salary	Typical top salary	Ratio of men to women	Tip and comments
26	Speech pathologist (34)	\$19,651	\$26,457	\$45,239	12/88	Bilingual practitioners are especially sought after.
27	Construction or project manager (33)	28,797 ¹⁰	49,452	92,194	98/2	Look for jobs on industrial projects, and be prepared to relocate.
28	Human resources specialist (32)	20,595	31,952	43,930	43/57	Small companies need people who know everything from benefits to job safety.
29	Restaurant or food service manager (32)	19,808	32,744	43,740	39/61	Requirements now include computer literacy at many establishments.
30	Visual artist (32)	23,814	26,960	51,488 ¹⁶	48/52	Be able to work with several graphics software programs.
31	Veterinarian (31)	29,591	41,847	77,120	73/27	The number of women vets has tripled since 1980.
32	Civil engineer (30)	29,123	41,188	66,227	94/6	Expertise in constructing pollution-control facilities will ensure employment.
33	Inspector/compliance officer (30)	15,697	22,419	39,966	77/23	The growth of government regulation creates boundless opportunity.
34	Adult education teacher (29)	15,718	22,192	39,360	60/40	Look for jobs at community colleges and mid-size companies.
35	Financial manager (28)	25,098 ¹¹	42,284	81,106	55/45	Talk your way into the expanding global investing field with foreign language skills.
36	Interior or industrial designer (26)	18,875	27,275	46,830	47/53	Make sure your training fits the licensing requirements in your state.
37	Writer or editor (26)	12,930 ¹²	18,048	62,927	49/51	Technical writers have the best employment prospects.
38	Architect (24)	28,084	41,066	86,019	83/17	Historic restoration and building renovations are the hot specialties now.
39	Insurance underwriter (24)	19,967	28,853	48,963	36/64	Actuaries tend to get the highest-paying entry-level jobs.
40	Mechanical engineer (24)	29,125	41,190	66,228	95/5	The three big specialties are robotics, robotics and robotics.
41	Nutritionist/dietitian (24)	17,000 ¹³	27,300	36,000	6/94	Food-processing firms need help coping with new federal labeling regulations.
42	Project cost estimator (24)	20,917	28,503	42,796	73/27	Best prospects are in industries like biotech, where the manufacturing process is evolving.
43	School administrator (24)	29,830 ¹⁴	41,524	66,163	45/55	It helps if you have a background in business administration as well as education.
44	Administrative manager (23)	26,057	41,920	68,833	42/58	Many are setting up their own firms to handle clerical work for large companies.
45	Employment interviewer (23)	21,412	31,309	42,708	24/76	Agencies that supply temporary office workers need interviewers.
46	Primary school teacher (23)	19,440	28,935	48,912	12/88	The fastest-growing student populations are in sunbelt states.
47	Purchasing agent (23)	16,481 ¹⁵	17,692	64,695	55/45	Telecommunications companies offer the best prospects for advancement.
48	Budget analyst (22)	23,712	32,305	43,468	40/60	Besides accounting skills, you need the ability to make effective presentations.
49	Clerical supervisor (22)	16,596	25,795	35,471	9/91	You usually need to start by doing the kind of work that you want to supervise.
50	Geologist (22)	30,866	45,943	64,503	89/11	Consulting firms need ground-water experts to help plan cleanup projects.

Sources: Bureau of Labor Statistics, Economic Research Institute. **Notes:** Top salaries do not reflect earnings of supervisors or managers unless otherwise noted. ¹BLS growth projections include scientific and engineering managers. ²Starting salary is for therapy aide; other salaries are for therapy managers. ³Salaries are for advertising managers. ⁴Salaries are for hotel managers. ⁵Brokers' earnings depend on commissions; salaries are for financial sales representatives. ⁶Salaries are for electrical engineers. ⁷Salaries are for corporate lawyers. ⁸Salaries are for general practitioners. ⁹Salary is for partners in consulting firms. ¹⁰Salaries are for construction superintendents. ¹¹Salaries are for accounting managers. ¹²Starting and median salaries are for writers; top salary is for editors. ¹³Salaries are from 1990 BLS data. ¹⁴Salaries are for principals and headmasters. ¹⁵Starting and median salaries are for agents; top salary is for purchasing managers. ¹⁶Top salary is for commercial artists.

THE 50 TOP JOB MARKETS

Here's where to find rewarding work.

Small and medium-size cities have the most favorable employment climates, as our table shows. These areas will thrive as companies continue to take advantage of the lower taxes and operating costs that can be found away from the older trade centers like New York and Chicago.

We identified the nation's most promising job markets by first looking for the metropolitan areas where employment would be growing faster than the projected national average rate of 3.6% a year. (Forecasts are by Woods & Poole Economics, a research firm in Washington, D.C.) From that group of 68 cities, we took the 50 that would be adding the most jobs.

To fill out each city's employment picture, we cite three jobs that are especially hot in the area, along with a representative salary for each, computed with the help of Economic Research Institute's surveys. And we calculated the buying power of each salary by adjusting it for the local cost of living. The typical computer programmer earns more in Washington, D.C. than in Fort Wayne. But because the nation's capital is a far more expensive place, the programmer's paycheck will go further in the Hoosier State.

Reporter associate: Jillian Kasky

METRO AREA (total new jobs by 1995)	Fast growing occupations	Typical salary	Purchasing power
1 Washington, D.C. (118,200)	Purchasing manager Computer programmer Accountant	\$43,800 34,600 34,000	\$35,600 28,100 27,600
2 Anaheim, Calif. (108,800)	Sales manager Financial service rep Photographer	45,000 33,000 33,500	34,000 24,900 25,300
3 Atlanta (104,600)	Operations analyst Physical therapist Psychologist	31,600 27,500 42,000	32,000 27,800 42,500
4 Phoenix (92,000)	Travel agent Computer systems analyst Financial manager	23,000 37,500 40,900	23,100 37,700 41,100
5 San Diego (77,100)	Psychologist Sales manager Medical services manager	42,600 40,800 59,900	36,600 35,100 51,400
6 Tampa-St. Petersburg (76,300)	Management analyst Computer programmer Computer systems analyst	29,500 29,300 37,500	30,400 30,200 38,600
7 Orlando (70,300)	Civil engineer Travel agent Primary school teacher	39,700 22,700 27,600	40,400 23,100 28,100
8 Dallas (69,300)	Computer systems analyst Financial service rep Operations analyst	39,200 27,800 30,000	39,800 28,200 30,500
9 Riverside, Calif. (67,700)	Sales manager Designer Accountant	39,400 28,300 31,500	35,300 25,300 28,200
10 Minneapolis-St. Paul (64,700)	Writer Psychologist Chemical engineer	18,700 41,700 52,400	18,600 41,500 52,200
11 Charlotte, N.C. (53,100)	Pilot Operations analyst Sales manager	35,200 30,500 39,800	34,900 30,200 39,400
12 Seattle (50,900)	Technical writer Computer systems analyst Financial service rep	39,800 42,300 29,800	34,900 37,200 26,200
13 Columbus, Ohio (48,300)	Management analyst Computer programmer Chemist	32,200 32,000 37,000	32,000 31,800 36,700
14 San Jose (47,900)	Computer systems analyst Technical writer Mechanical engineer	44,200 41,500 46,900	34,400 32,300 36,500
15 Oakland (46,600)	Computer programmer Physical therapist Computer systems analyst	36,100 30,300 45,000	30,500 25,500 38,000
16 Fort Worth (45,700)	Property manager Accountant Computer programmer	49,600 28,900 29,400	51,600 30,000 30,500
17 Sacramento (45,500)	Management analyst Purchasing agent Accountant	34,600 20,100 33,800	30,900 17,900 30,200

METRO AREA
(total new jobs
by 1995)

18 Cincinnati
(44,500)

19 Raleigh-Durham
N.C.
(44,000)

20 Portland, Ore.
(43,200)

21 Indianapolis
(42,100)

22 West Palm Beach
Fla.
(40,100)

23 Fort Lauderdale
(39,200)

24 Greensboro-
Winston-Salem,
(37,500)

25 New Brunswick
N.J.¹
(33,500)

26 Las Vegas
(32,700)

27 Milwaukee
(32,700)

28 Nashville
(32,100)

29 Grand Rapids
(29,200)

30 Greenville, S.C.
(28,100)

31 Rochester, N.Y.
(27,800)

32 Austin
(26,800)

33 Providence
(25,300)

SECTION 8
EVALUATION OF FACILITIES AND EQUIPMENT

The PRP designed a questionnaire to determine the facility and equipment needs of all the BSEET courses. This questionnaire identified the lab room used by the course and provided a rating scale for the facility and equipment utilized in the course. The survey instrument is shown on the next page. Each instructor was given survey forms and asked to review the 4 main courses they normally would teach. All 9 instructors responded for a 100% response rate.

The BSEET facilities and equipment were also evaluated by ABET. Their evaluation is presented below under their "Program Strengths" section of the ABET October 1994 report.

"Program Strengths

The program has good classroom and laboratory facilities. The laboratories are well equipped and almost all have either 386 or 486 PC's at every work station. Through a NSF grant, the department will soon be acquiring SUN SPARC work stations with MENTOR graphics software, thus extending their laboratory capabilities considerably. The technology building is clean and well maintained."

(Since the ABET visit most labs have been upgraded to 486 or pentium PC's.)

Summary of Results

The response from the facilities and equipment investigation reveals:

1. **The average rating of facilities is 2.4 out of a possible 3.0 (1 - poor, 2 - good, 3 - excellent)**
2. **The average rating of equipment is 2.1 or good.**
3. **The two primary concerns appear to be the need to upgrade the older computer and lack of enough lab stations. Five courses were rated below 2 in equipment.**
4. **The current equipment needs will require about \$150,650.00.**

SURVEY RESULTS

Evaluation of Facilities and Equipment

From Faculty Members 1-21-96

Rating Scale Poor - to - Excellent
1 to 3

Lab Room #	Course #	Facilities	Equipment	Comments
401	EEET 322	3	3	Excellent Shape
406	EEET 115	2.5	2.5	OK for this class
	EEET 224	3	3	A/D cards for PLCs @\$800ea X 8 = \$6,400
	EEET 225	2	2	Replace the 20(+) year old Tektronix series 5000 O'scopes. Many Have intermittent problems and are difficult for the related students to understand/operate. 10 @ \$2,500 = \$25,000.
	EEET 228	2.5	2.5	OK for this class except more relay trainer boards
	EEET 315	1.5	1.5	Either more computers or PLC's or fewer students per lab
	EEET 317	3	3	None
	EEET 318	2	2	Update scopes - \$2,000 ea.
	EEET 423	3	3	A/D cards for PLC's \$800 X 8 = \$6,400
408	EEET 122	3	3	OK
	EEET 212	2	2	None
	EEET 222	2	2	None
	EEET 310	3	3	OK
	EEET 311	3	3	Computer Screen projector \$3,000
	EEET 412	3	2	Prom/PLD programmer & software -\$6,000, (8) Logic Analyzer Pods, (12) Micro Controller Hardware (SBC's) - 6-10K, Micro controller development tools - 2, > 100 Mhz digital scopes (desirable) - \$4,000 PLD development tools are becoming increasingly important to advanced digital. Micro controller development, training, & observation tools are going to need updating soon
	EEET 422	2	2	A prototyping system that produce high density double sided printed circuit boards. What we currently have is fine for low density (\$10,000)

Facilities and Equipment Page 2

411	EEET 210	2	2	Need 14 good quality FM generators. The VIZ model LOR-SOC RF generator FM sweep is highly non-Linear and not adjustable - Does not meet our needs. 14 @ \$2,000 = \$28,000
	EEET 411	2	1	Cal. R.F. Generators - \$4,500 Spectrum Analyzers - \$7,500 100 MHZ time delay scopes - \$2,500 A.M. Transceivers - \$100 ea. F.M. Transceivers - \$2500 T.D.R. - \$3,500
	EEET 412	2	2	Helpful to have an additional logic analyzer. (5 currently) \$3,000. Additional 80C186 training boards would be helpful.
	EEET 421	2	1	Same as EEET 411 above
<hr/>				
412	EEET 322	3	3	Could use developer tank designed for non-solvent use - \$1000.
<hr/>				
413	EEET 215	2	1	Function Generators 10 @ 300ea Cap. Decade Boxes 10 @ \$200ea Compasses 10 @ \$5.00ea Magnets 10 @ \$5.00ea Protoboards 10 @ \$20.00 ea Inductor Decade Boxes 10 @ \$150 ea Freq. Counters 10 @ \$300 ea
	EEET 223	2	2	None
	EEET 227	2	2	New function generators - 8 @ \$250ea
	EEET 413	3	3	None

Facilities and Equipment Page 3

416	EEET 110	3	1	Computer upgrade needed. Can not now run programs used for class. More students than lab stations. Need 8-9 computers at least 486. All need 8 Megs Min.
	EEET 114	2	2	10 - High quality soldering stations. The soldering irons we now use are literally \$4.00 a piece items & do not meet continuous duty needs. Require 10 @ \$65 = \$650.00

EEET 124	2.5	2	The 5 old Gateways (386/16Sx) are not adequate to run "Workbench". Need to consider upgrade. Coprocessor + DX2 - \$150 ea X 5 = \$750. New Machines - \$1800 X 5 = \$9,000.
EEET 211	2	2	None

Average Rating of Facilities is 2.4 (Between Good and Excellent)
Average Rating of Equipment is 2.1 (Good)

SECTION 9
Curriculum Evaluation

This section contains the ABET 1994 visitation review comments on the BSEET program. Also included are the Industrial Electronics Technology (IET) curriculum guide sheet and the BSEET curriculum guide sheet.

An Analyst Summary of this section demonstrations:

1. **BSEET meets University requirements.** The BSEET program meets or exceeds all requirements for Communications, Cultural Enrichment, Social Awareness, Scientific Understanding, and Quantitative Skills. In addition the BSEET degree exceeds the minimum required credits of 120 semester hours.
2. **BSEET curriculum provides courses that prepare graduates for the workplace.** The curriculum covers the fundamental topics, giving the students a sound foundation in electronics. The upper division courses build on this foundation giving the graduates "real world" skills to take to the work place.
3. **The BSEET program articulates well with 24 of Michigan's community colleges that offer associate degrees in electronics.** Historically, the make up of the BSEET program has been 60% transfer students and 40% Ferris students.

**INDUSTRIAL ELECTRONICS TECHNOLOGY
ASSOCIATE IN APPLIED SCIENCE DEGREE
FALL SEMESTER 95/96
Curriculum Guide Sheet**

NAME OF STUDENT _____

STUDENT I.D. _____

Total semester hours required for graduation: 66

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 assist you.

FIRST YEAR - FALL SEMESTER

EEET 110 IET Technical Preparation
EEET 114 Electrical Circuits 1
MATH 116 Intermediate Algebra & Numerical Trigonometry
ENGL 150 English 1
_____ Cultural Enrichment Elective

CREDITS

COMMENTS/GRADE

3	
4	
4	
3	
3	

FIRST YEAR - WINTER SEMESTER

EEET 121 Electronics 1
EEET 122 Digital 1
EEET 124 Electric Circuits 2
MATH 126 Algebra & Analytic Trigonometry

4	
4	
4	
4	

SECOND YEAR - FALL SEMESTER

EEET 210 Communication Circuits
EEET 211 Electronics 2
EEET 212 Digital 2
PHYS 211 Introductory Physics 1
ENGL 250 English 2

3	
3	
4	
4	
3	

SECOND YEAR - WINTER SEMESTER

EEET 221 Troubleshooting
EEET 222 Microprocessor Applications
EEET 223 Transducers and Control Applications
EEET 224 Industrial Automation and Motors
_____ Social Awareness Elective

3	
4	
2	
4	
3	

**ELECTRICAL/ELECTRONICS ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE DEGREE
FALL SEMESTER 9596
Curriculum Guide Sheet**

NAME OF STUDENT _____

STUDENT I.D. _____

Total semester hours required for graduation: 70 beyond A.A.S. degree

NOTE: Meeting 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 assist you.

THIRD YEAR - FALL SEMESTER		CREDITS	COMMENTS/GRADE
EEET 310	High Level Programming (MATH 126)	2	
EEET 311	Linear Electronics (JR status in EEET)	4	
MATH 216	Applied Calculus	4	
ENGL 311	Advanced Technical Writing	3	
_____	_____ Chemistry or Physics Elective	4	
THIRD YEAR - WINTER SEMESTER			
EEET 320	Assembly Language Prog. for Electronics (EEET 310)	2	
EEET 321	Network Analysis (EEET 311, MATH 226 co-req)	3	
EEET 322	CAD for Electronics	1	
MATH 226	Fourier Series & Application Differential Equations	4	
COMM 121	Fundamentals of Public Speaking	3	
_____	_____ Technical Science Elective	4	
THIRD YEAR - SUMMER SEMESTER			
EEET 393	Internship	4	
FOURTH YEAR - FALL SEMESTER			
EEET 411	Advanced Communications 1* (EEET 210 & 321)	4	
EEET 412	Advanced Digital 1* (EEET 222 & 311)	4	
EEET 413	Advanced Industrial Automation 1* (EEET 321)	4	
EEET 418	Project Management (Senior Standing)	2	
_____	_____ Cultural Enrichment Elective**	3	
_____	_____ Social Awareness Elective**	3	
FOURTH YEAR - WINTER SEMESTER			
EEET 421	Advanced Commuunications 2 (EEET 411)	4	
EEET 422	Advanced Digital 2 (EEET 412)	4	
EEET 423	Advanced Industrial Automation 2 (EEET 413)	4	
EEET 428	Senior Project (EEET 418)	2	
_____	_____ Cultural Enrichment Elective**(200 or above)	3	
_____	_____ Social Awareness Elective** (300-400)	3	

*SENIORS MUST CHOOSE ANY SEQUENCE OF 2 SERIES OF 411/421, 412/422 OR 413/423

**One of the Cultural Enrichment or Social Awareness electives should be chosen to satisfy the Global Consciousness requirement in order to avoid additional credit work beyond the requirements of this checksheet. Two areas must be chosen in both Cultural Enrichment and Social Awareness. One Social Awareness course must be a Foundations course.

FERRIS STATE UNIVERSITY

Program Strengths

1. The program has good classroom and laboratory facilities. The laboratories are well equipped and almost all have either 386 or 486 PC's at every work station. Through a NSF grant, the department will soon be acquiring SUN SPARC work stations with MENTOR graphics software, thus extending their laboratory capabilities considerably. The technology building is clean and well maintained.
2. The support areas appear to be excellent, particularly mathematics and English. The mathematics department faculty worked directly with the College of Technology faculty to develop the present technical mathematics course sequence. In addition, the mathematics department is using the DERIVE software package in the calculus courses. The English department faculty teaching the technical writing course consult regularly with the technology faculty regarding course content.
3. There is good secretarial and technician support for the program. The technician has ample storage room as well as a separate repair area in which to work. The department is able to maintain all of its own equipment.
4. One of the outstanding strengths of the program is the internship program that gives students industrial experience in their field of study. The internship course, EEET 393, is well organized and contributes to the competence of the graduates. This program should continue to be supported to the maximum extent possible.

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5. The morale of the faculty is very high concerning the Electrical/Electronic Engineering Technology program. They are enthusiastic about teaching students and developing the program. The students are complimentary of the faculty and their availability to assist above and beyond normal classroom duties. The number of faculty and the low student/faculty ratio contribute to the availability of individual assistance to the students.

Program Weaknesses

NOTE: The weaknesses cited under Institutional Factors are applicable to this program area as well.

1. Most of the faculty do not have basic credentials as specified in section V.F.1. of the ABET criteria. It is required that the number of FTE faculty members with basic credentials be increased to meet the requirements of section V.F.5. of the ABET criteria which states that at least two-thirds of the FTE faculty of a baccalaureate degree program must have basic credentials. ****The institution responded that a reduction of the faculty without basic credentials has brought them within criteria compliance. This was accomplished through a retirement, a graduation with masters degree, and two faculty reassignments.****

2. One objective of an engineering technology program is to educate their students for satisfactory employment upon graduation. According to section V.I. of the ABET criteria, an creditable program must demonstrate employer satisfaction with recent graduates. There is very little evidence to show that employers of the program's graduates have been surveyed. It is required that adequate employer surveys be

Electronics / Electrical
Engineering Technology

APRC 1995-1996

Section 2 of 2

ELECTRONICS 95-96

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conducted. This information can be valuable in improving the direction and content of the program. ****The institution established a new employer survey which was included with the response. This new instrument is being administered and data should be tabulated by Fall 1995.****

3. The student course work display material available to the evaluation team was inadequate. For one course the textbook was not available, and for many courses, examples of student work were minimal or non-existent. According to section III.B.1.c.9. of the ABET criteria, it is necessary that the course outlines and textbooks for all courses required for graduation be exhibited. Further, sufficient examples of student work, including laboratory reports, homework, projects, and samples of computer usage in technical, mathematics, and science courses must be available to the visiting team. It is required that these materials be made available during subsequent TAC of ABET evaluation visits. ****The institution responded that since this was an initial accreditation visit, the desired amount of display material was unknown. For future visits adequate materials will be displayed.****

4. Except for the senior project course, there was no evidence that oral reports were required in any other courses. The display material showed few examples of written reports, particularly laboratory reports. Technically trained individuals must be able to communicate both orally and in writing, their technical findings, thoughts, and philosophy to others around them. Section V.C.5.a. of the ABET criteria states that there must be evidence that both oral and written communications have been taken into account in the review and evaluation of student technical work. Further, section VI.J.2. of the ABET criteria states that technical science courses must have an emphasis on data collection and analysis along with written and oral

3

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report preparation and presentation. It is required that students be assigned written and oral reports throughout their course work as explained in sections V.C.5.a. and VI.J.2. of the ABET criteria. This written and oral course work must be corrected and taken into account in the evaluation of the student work.

****The institution stated that the majority of technical courses have been modified to require oral and written communications. Course outlines were included with the response.****

5. The utilization of calculus in the upper division electronics, communications, and automation courses is apparently non-existent. Section V.C.4.c.2. of the ABET criteria states that "upper-level technical courses must include applications of calculus in technical problem solving where appropriate." It is required that appropriate calculus-based topics be incorporated in upper division courses such as Fourier analysis in communications and LaPlace transforms in the automation courses. ****The institution responded that calculus is being used in some upper level courses and will be extended in others through proper textbook selection. Course material was included with response.****

6. There was no evidence that the Industrial Advisory Committee had been consulted regarding program content. A properly functioning Industrial Advisory Committee can contribute significantly to the growth and development of an engineering technology program. Section V.J.1.a.3. of the ABET criteria states that an effective Industrial Advisory Committee should "periodically review program offerings¹ and course content to ensure that the current and future needs of engineering technologists in industry are being met." Further, section V.J.2. of the ABET criteria states that the advice of the committee must be given serious consideration and when such advice cannot be taken, such a decision must be supported by good

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reasons. It is recommended that the Industrial Advisory Committee review program content on a regular basis and that their input be evaluated and used in program development. ****The institution stated that the Industrial Advisory Committee has addressed the ABET recommendations. More effective meetings are scheduled twice per year, and better minutes will be taken.****

7. Many of the upper-level courses had unnecessary redundancy with lower level courses. Section V.E.3. of the ABET criteria states that upper division programs should continue the "building block" basis of the lower division, and must properly build on this foundation. It is recommended that the amount of redundancy be reduced and the advanced material be built on the lower division courses. ****The institution stated that course improvements have been implemented by using a new textbook for one course and more rigorous subject coverage in another course. Course outlines were included with the response.****

8. The program requires only one technical course outside of Electrical/Electronics Engineering Technology. The requirements of sections V.A.2.e., V.C.1., and VI.J.2.a. of the ABET criteria, as related to producing a "well-rounded" and broadly-based engineering technologist, are not being satisfied. In order to satisfy these criteria, it is recommended that the number of courses in Electrical/Electronics Engineering Technology be reduced and replaced with other technology courses such as Quality Assurance, Heat Transfer, etc. ****The institution modified the curriculum to allow for a technical elective. A copy of the curriculum check sheet was included in the response.****

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9. The faculty require only minimal usage of the library in the preparation of reports and projects. In compliance with sections V.K.5. and V.D. of the ABET criteria, it is recommended that faculty increase the students' usage of the library. ****The institution stated that Electrical/Electronic Engineering Technology courses have been modified to include library assignments. Course outlines were included in the response.****

10. The present department head does not have basic credentials as explained in section V.F.1. of the ABET criteria. It is recommended that the department head obtain basic credentials as stated in section V.F.7. of the ABET criteria. ****The institution reported that the department head graduated with a master's degree in Career and Technical Education in May 1995. This, coupled with his BSEE and professional engineering registration, meets basic faculty credentials.****

11. The academic rigor of the textbooks used in the upper division courses, in some cases, is more appropriate to lower division courses. It is suggested that the texts used in the Linear Electronics, EEET311, Advanced Automation 1, EEET413, Advanced Automation 2, EEET423, and Advanced Communications 2, EEET421, courses be evaluated for more appropriate texts or supplementary material.

12. Currently, Electrical/Electronics Engineering Technology students can complete the program degree requirements without exposure to digital communications. It is suggested that the present analog communications course at the sophomore level be replaced with a course which included in-depth coverage of basic digital communications.

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13. Because program graduates are likely to find data acquisition and analysis required on their first job, it is suggested that such a course be included in the lower division program. Most of the laboratories have computers, and this could be done at a very reasonable cost.

14. In order to improve student benefits from the senior design course, it is suggested that more projects from industry be included. One way this could be done is through increased cooperation with the Technology Transfer Center and assistance from the Industrial Advisory Committee.

15. The overall focus of the program is not clear and appears to attempt to educate students in almost all areas of electronics. It is suggested that the program sharpen its focus to one or two areas appropriate to the industries being served.

SECTION 10
ENROLLMENT TRENDS

The five year enrollment trends are presented below.

Majors (on/off campus):
(includes only 3rd and 4th year)

<u>1991-92</u>	<u>1992-93</u>	<u>1993-94</u>	<u>1994-95</u>	<u>1995-96</u>
N/A	56/12	69/12	68/10	69/10

The BSEET Program has good and stable enrollment.

SECTION 11
PROGRAM PRODUCTIVITY/COST

The department program productivity cost for the past five year are shown below.

SCH/FTEF

<u>90-91</u>	<u>91-92</u>	<u>92-93</u>	<u>93-94</u>	<u>94-95</u>	<u>95-96 (est.)</u>
342	326	350	288 (432)	304 (456)	348 (522)

note: change from quarters to semesters in 93-94.
Quarter equivalents are shown in ().

In the past two years, the department has been reduced by 3 FTEF's. (From 12 to 9). As can be seen the productivity is improving.

Program Costs:

The only program costs currently available are for 1989-1990. Institutional Studies has not produced program costs since this date.

SECTION 12 CONCLUSIONS

1. The BSEET Program Mission is Central to the Mission of Ferris State University.

The mission of the Electrical/Electronics Department is to educate students in electrical/electronics programs valuable to Michigan's economic future and to provide educational service to business and industry. The curricula of engineering technology with complementary technical specialty programming integrates the appropriate general education courses needed to prepare today's graduates with the foundation of knowledge required to cope with advancing technology within their professional careers.

The Electrical/Electronics Department is committed to providing its diverse student body with strong technical curricula emphasizing practical, usable skills that prepare the graduate to analyze, synthesize and problem-solve within their discipline.

2. Uniqueness/Visibility and Demand by Students

Some of the unique qualities of the program are:

- a. The hands on approach to the course work and laboratories within the program.
- b. The 2 + 2 structure of the program making it visible to 24 community Colleges from which 60% of the BSEET students transfer, as demonstrated in section 9. The visibility of the program is also apparent to the many employers of our graduates as noted in section 3.
- c. Our enrollment number show a good and stable trend since the inception of the program as indicated in section 10.

3. Service to State and Nation and Demand for Graduates:

Our labor market analysis (Section 7) indicates strong demand for our graduates, as evidenced by their placement rate and their high salaries. All of our graduates, since the inception of the program, are employed in their field.

4. Quality of Instruction

The ABET Accreditation of 1995 attests to our quality of instruction.

From Section 4 it can be noted that students perceive the faculty as knowledgeable and helpful and the courses as challenging and well presented. Section 6 indicates that the advisory committee believes the program content to be of high quality.

5. Service to Non-majors

The E/E Department offers courses to HVACR, Manufacturing, Welding, Product Design, Mechanical Engineering Technology, and Plastics. Nearly 35% of all student credit hours produced in the department are to non-majors.

6. Facilities and Equipment

From the surveys conducted it is evident that some pieces of equipment are dated and should be replaced. Additional equipment is needed to facilitate larger sections in some labs for more efficient utilization of faculty and facilities. Overall the facilities and equipment are adequate, however, they do need up-dating to keep current with today's technology.

7. Library Information Resources

Library information resources are good, however, there need to be more periodicals and journals for the BSEET program, per the review team for TAC/ABET.

8. Faculty: Professional and Scholarly Activities

Faculty are all involved with professional organizations which reflect their respective interests. All are involved in student advising. Each faculty serves on several committees at the department, college, or university level. Several have written papers, delivered papers, and are involved in consulting.

9. Administration Effectiveness

Per Section 4 the student perception is that "The administration is doing a good job". The administration is supportive in maintaining high academic standards as evidenced by ABET accreditation. The administration has provided a stable and supportive work environment which has resulted in no faculty turnover for the last eight years. Administration has been aggressive in obtaining industrial support in terms of equipment donations and scholarships.

SECTION 13 RECOMMENDATIONS

Enhance the Program:

The program meets or exceeds all criteria and it warrants expansion in enrollment to meet the manpower needs in the State of Michigan. A program enhancement may involve additional faculty/staff, equipment, or other resources and/or expansion in enrollment. However, such an expansion would not be initiated without the allocation of resources needed to maintain quality with an enlarged student body.

Reasons for Enhancement

1. The BSEET program is central to the FSU mission.
2. The demand for BSEET graduates is strong and is projected increase in the future.

Suggestions for Enhancement

1. Increase university marketing support for our BSEET program.
2. Modernize the laboratory facilities and equipment.
3. Increase support for faculty development to keep up with the rapids advance in technology to strengthen industrial relations.

Appendix G

PROGRAM REVIEW PANEL EVALUATION FORM

Program TOTALS

Instructions: Circle the number which most closely describes the program you are evaluating.

1. Student Perception of Instruction

Average Score 4.0

5	4	3	2	1
---	---	---	---	---

Currently enrolled students rate instructional effectiveness as extremely high

Currently enrolled students rate the instructional effectiveness as below average

2. Student Satisfaction with Program

Average Score 4.3

5	4	3	2	1
---	---	---	---	---

Currently enrolled students are very satisfied with the program faculty, equipment, facilities, and curriculum

Currently enrolled students are not satisfied with program faculty, equipment, facilities, or curriculum

3. Advisory Committee Perceptions of Program

Average Score 4.5

5	4	3	2	1
---	---	---	---	---

Advisory committee members perceive the program curriculum, facilities, and equipment to be of the highest quality

Advisory committee members perceive the program curriculum, facilities, and equipment needs improvement

4. Demand for Graduates

Average Score 4.8

5	4	3	2	1
---	---	---	---	---

Graduates easily find employment in field

Graduates are sometimes forced to find positions of their field

5. Use of Information on Labor Market

Average Score 3.8

5	4	3	2	1
---	---	---	---	---

The faculty and administrators use current data on labor market needs and emerging trends in job openings to systematically develop and evaluate the program

The faculty and administrators do not use labor market data in planning or evaluating the program

6. Use of Profession/Industry Standards

Average Score 4.6

5	4	3	2	1
---	---	---	---	---

Profession/industry standards (such as licensing, certification, accreditation) are consistently used in planning and evaluating this program and content of its courses

Little or no recognition is given to specific profession/industry standards in planning and evaluating this program

7. Use of Student Follow-up Information

Average Score 3.5

5	4	3	2	1
---	---	---	---	---

Current follow-up data on completers and leavers are consistently and systematically used in evaluating this program

Student follow-up information has not been collected for use in evaluating this program

8. Relevance of Supportive Courses

Average Score 4.0

5	4	3	2	1
---	---	---	---	---

Applicable supportive courses are closely coordinated with this program and are kept relevant to program goals and current to the needs of students

Supportive course content reflects no planned approach to meeting needs of students in this program

9. Qualifications of Administrators and Supervisors Average Score 4.0

5	4	3	2	1
All persons responsible for directing and coordinating this program demonstrate a high level of administrative ability			Persons responsible for directing and coordinating this program have little administrative training and experience	

10. Instructional Staffing Average Score 4.2

5	4	3	2	1
Instructional staffing for this program is sufficient to permit optimum program effectiveness			Staffing is inadequate to meet the needs of this program effectively	

11. Facilities Average Score ~~4.0~~ 3.7

5	4	3	2	1
Present facilities are sufficient to support a high quality program			Present facilities are a major problem for program quality	

12. Scheduling of Instructional Facilities Average Score 3.8

5	4	3	2	1
Scheduling of facilities and equipment for this program is planned to maximize use and be consistent with quality instruction			Facilities and equipment for this program are significantly under-or-over-scheduled	

13. Equipment Average Score 3.3

5	4	3	2	1
Present equipment is sufficient to support a high quality program			Present equipment is not adequate and represents a threat to program quality	

14. Adaption of Instruction

Average Score 4.0

5	4	3	2	1
---	---	---	---	---

Instruction in all courses required for this program recognizes and responds to individual student interests, learning styles, skills, and abilities through a variety of instructional methods (such as, small group or individualized instruction, laboratory or "hands on" experiences, credit by examination)

Instructional approaches in this program do not consider individual student differences

15. Adequate and Availability of Instructional Materials and Supplies

Average Score 3.3

5	4	3	2	1
---	---	---	---	---

Faculty rate that the instructional materials and supplies as being readily available and in sufficient quantity to support quality instruction

Faculty rate that the instructional materials are limited in amount, generally outdated, and lack relevance to program and student needs

APPENDIX

BIOGRAPHICAL DATA

1. Name Clare F. Cook
2. Department: Electrical/Electronics
3. Age: 40
4. Academic Rank: Associate Professor (Full-time)
5. Degrees:
 - MS, Electrical Engineering
University of Akron
1985
 - BSE, Electrical Engineering
University of Michigan
1979
 - BSEET, Electronic Engineering Technology
Lake Superior State University
1979
 - AS, Computer Engineering Technology
Lake Superior State University
1978
 - AS, EET Electronic Engineering Technology
Lake Superior State University
1974
6. Number of years service on this faculty:
 - 7 years
7. Other teaching experience:
 - Electronic Technology Assistant Professor
University of Akron
1980 - 1987
8. Full-time industrial experience:
 - Lake Superior State University
1974 - 1978
Electronic Technician
9. Part-time industrial experience:
 - None

10. Consulting work:

Park-Davis Pharmaceutical Research
1990 - 1993
Electronic Machine Modifications of existing
production equipment

Akron Selle Company
1984
Wrote troubleshooting manuals for control
electronics in metal presses.

11. Professional recognition:

Engineer-in-training, Ohio

12. Principal publications of last five years:

"Circuit Analysis, Simulation and Layout
Using Graphic Workstations in an Engineering
Technology Program", American Society for
Engineering Education, North Central
Conference Proceedings, April 1990.

"Using Electronic CAD Tools in Prototype
Design and Fabrication", American Society for
Engineering Education, North Central
Conference Proceedings, April 1991.

13. Scientific and professional societies of which a member:

ASEE

14. Honors and awards:

None

15. Specific program to improve teaching and professional
competence in which participated during the last five years:

Attended two National Science Foundation
Funded Workshops

MicroFabrication Laboratory Workshop at San
Jose State University - 1992

Educating Engineers using modern tools at
University of Notre Dame - 1993

BIOGRAPHICAL DATA

1. Name Warren Klope
2. Department: Electrical/Electronics
3. Age: 39
4. Academic Rank: Assistant Professor (Full-time)
5. Degrees: B.S. Engineering
Oakland University
1977

M.S. Engineering
Oakland University
1987
6. Number of years service on this faculty:

7 years
7. Other teaching experience:

None
8. Full-time industrial experience:

U.S. Army Tank Automotive Command
1984 - 1985
Project Engineer

U.S. Army Tank Automotive Command
1981 - 1984
Mechanical Engineer

Chrysler Corporation Defense Division
1980
Math Analyst - Programmer

Chrysler Corporation
1979 - 1980
Math Analyst - Real Time Programmer

Chrysler Corporation
1977 - 1979
Chrysler Intern Engineer - Mechanical
Engineer - Math Analyst

9. Part-time industrial experience:
None
10. Consulting work:
None
11. Professional recognition:
None
12. Principal publications of last five years:
None
13. Scientific and professional societies of which a member:
ASEE
14. Honors and awards:
None
15. Specific program to improve teaching and 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.
Numerous University, College and Department committee membership work. Average hours per week (5).
17. Other duties performed for extra compensation during academic year, with average hours per week:
None
18. Recent summer assignments not shown above:
None
19. Any other pertinent information:
None

BIOGRAPHICAL DATA

1. Name Philip P. Marcotte
2. Department: Electrical/Electronics
3. Age: 54
4. Academic Rank: Assistant Professor/Department Head
5. Degrees: MSOE - abt
BSEE - 1967
ASE - 1960
6. Number of years service on this faculty:
9 years (3 years teaching / 6 years administrative)
7. Other teaching experience:
None
8. Full-time industrial experience:
USAF
1961-1965
Missile Electronic Technician

North American Aviation
1967-1968
Graduate Engineer

Consumers Power Company
1968-1985
Engineer
9. Part-time industrial experience:
Machine Shop
1959
Clean-up and some light duty machine work

State of Michigan
1960
Rodman on Survey crew

Pipeline
1966
General labor on gas distribution pipeline

10. Consulting work:

AC Rochester
1991
Electronic training for welder maintenance
and repair people

11. Professional recognition:

Registered Professional Engineer, State of
Michigan, 1971.

12. Principal publications of last five years:

None

13. Scientific and professional societies of which a member:

Instrument Society of America

14. Honors and awards:

None

15. Specific program to improve teaching and professional
competence in which participated during the last five years:

DACUM (Developing a CURriculum) training as
facilitator. Presentation Excellence work
shop, how to give effective talks. Management
Development Retreats conducted on campus each
year for administrators.

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

Chaired and served on various committees for
the vice president of academic affairs and
for the president. Editor of the College of
Technology Newsletter. Conduct tours of E/E
facilities for families, schools, and
industrial visitors. Speak to students at
career centers, high schools and community
colleges promoting technology and
engineering.

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

None

18. Recent summer assignments not shown above:

12 month employee as department head

19. Any other pertinent information:

None

BIOGRAPHICAL DATA

1. Name Ronald A. McKean
2. Department: Electrical/Electronics
3. Age: 38
4. Academic Rank: Assistant Professor (Full-time)
5. Degrees: MS, Electrical Engineering
 University of Michigan
 1985

 BS, Electrical Engineering
 Lawrence Technological University
 1981

 AS, Electronics Engineering
 Ohio Institute of Technology
 1976
6. Number of years service on this faculty:

 4 years
7. Other teaching experience:

 AC Rochester
 Provided on-site Industrial Automation
 courses.
8. Full-time industrial experience:

 Technical Advantage
 1987 - Present (Summers)
 Owner - Contract design and consulting
 services specializing in microprocessor based
 instrumentation and software. Projects
 include: ccd camera design, ccd camera
 controllers, fiber sensor instrumentation,
 spectrometers, interface hardware and control
 software.

April 1, 1994

BioPhotonics Corporation
1992 (Summer)

Senior Research and Development Engineer -
Research and develop high photometric
resolution ccd camera for use in low light
biological applications.

KMS Fusion, Incorporated
1986 - 1990

Technical Manager/Development Engineer -
Management of Electrical Engineering
department. Research, design, and development
of new products in areas of biotechnology and
diagnostic instrumentation. Writing
proposals, patent committee member, and
investigation into new business
opportunities. Projects Include: DNA Imaging
System, Semi-Automated Interferometric
System, Perfused Cell Analysis System,
Electro-Optical Instrument for
Immunodiagnostic Assay Quantitation.

GSE, Incorporated
1981 -1986

Project Engineer/Software Engineering Manager
- Design and Development of industrial
weighing, parts counting, and torque fastener
systems. Manage the Software Engineering
group and UNIX based development systems.

Digital Techniques
1979 - 1981

Project Engineer - Organize and develop
hardware and software for customized
industrial gaging and multiplexed power
monitoring systems. Project specialist for
multiplexed power monitor systems.

Perkin-Elmer Corporation
1977 - 1979

Field Service Engineer - Installation and
service of atomic absorption
spectrophotometers, UV-VIS spectrometers, and
other related laboratory instrumentation.

9. Part-time industrial experience:

April 1, 1994

Technical Advantage

1986 - Present

Owner - contract design and consulting services specializing in microprocessor based instrumentation and software. Current projects include:

Design and Proposal for high sensitivity bio-sensor instrument.

Design and construction of a high resolution/high speed ccd camera.

CCD Camera Controller Designs and Product Development.

10. Consulting work:

Technical Advantage, March 1986 - Present

Owner - contract design and consulting services specializing in microprocessor based instrumentation and software. Current projects include:

Design and Proposal for high sensitivity bio-sensor instrument.

Design and construction of a high resolution/high speed ccd camera.

CCD Camera Controller Designs and Product Development.

11. Professional recognition:

None

12. Principal publications of last five years:

"Image Acquisition and Processing System for the Analysis of Fluorescence from Stained DNA Gels, Dept. of Energy" Final Report - 1990

13. Scientific and professional societies of which a member:

Society of Photo-Optical Instrumentation Engineers
Institute of Electrical and Electronic Engineers
Tau Beta Pi

April 1, 1994

14. Honors and awards:

Patent: Image Acquisition System for the
Analysis of Fluorescence from Stained DNA
Gels (4,960,999)

15. Specific program to improve teaching and professional
competence in which participated during the last five years:

Project Management Engineering 1990

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

Academic Advisor, various university, college
and department committees, advisor for
student branch of I.E.E.E. (4 hours/week)

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

None

18. Recent summer assignments not shown above:

As indicated above.

19. Any other pertinent information:

BIOGRAPHICAL DATA

1. Name Rickie L. Miller
2. Department: Electrical/Electronics
3. Age: 45
4. Academic Rank: Associate Professor (Full-time)
5. Degrees: MS, Electrical Engineering
The Ohio State University
1971

BSEE, Electrical Engineering
General Motors Institute
1970
6. Number of years service on this faculty:

9 years
7. Other teaching experience:

Columbus Technical Institute
Columbus OH
1980 - 1985
Electronics Instructor - Part-time
8. Full-time industrial experience:

Kaiser Aluminum and Chemical Corporation
Newark, OH
1973 - 1977
1979 - 1985
Staff Project Electrical Engineer

H. A. Williams and Associates
1977 - 1979
Columbus, OH
Electrical Project Manager

General Motors Corporation
Defiance, OH
1971 - 1973
Electrical Project Engineer

9. Part-time industrial experience:

General Motors Corporation
Defiance, OH
1966 - 1970
Co-op Engineering Student

10. Consulting work:

Evert Products
Evert, MI
1993 - 1994
Taught Electrical Maintenance Training Course

Howmet Corporation
Whitehall, MI
1988 - 1989
Study of a Tool Breakage Detector for C.N.C.
Lathe.

11. Professional recognition:

Registered Professional Engineer
States of Michigan and Ohio

12. Principal publications of last five years:

None

13. Scientific and professional societies of which a member:

American Radio and Relay League (A.R.R.L.)

14. Honors and awards:

Tau Beta Pi, Michigan Zeta Chapter, Honorary
Fraternity.

15. Specific program to improve teaching and 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.

Academic Advising, (4 hours/week)
Committee Assignments, (2 hours/week)

Ferris State University
Electrical/Electronics Department

April 1, 1994

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

None

18. Recent summer assignments not shown above:

None

19. Any other pertinent information:

Amateur Radio Operator-Advanced Class, N8IWO.

BIOGRAPHICAL DATA

1. Name Daniel S. Smalley
2. Department: Electrical/Electronics
3. Age: 46
4. Academic Rank: Associate Professor (Full-time)
5. Degrees: BSEE Electrical Engineering
General Motors Institute
1971
6. Number of years service on this faculty:
14 years
7. Other teaching experience:
Provides basic power systems training to
metal casting industry.
1991 - 1994
8. Full-time industrial experience:
General Motors Corporation - Central Foundry
Division
Senior Electrical Project Engineer
1978 - 1980
Electrical Engineer
1971 - 1994
9. Part-time industrial experience:
None
10. Consulting work:
Electrical Power and Control consultant for
Casting Industry. Specialized in high power
systems for induction furnaces.
1983 - 1994

11. Professional recognition:

P.E. license in State of Michigan

Gave presentation on "Electrical Ground Fault Problems and Solutions" in Adelaide, Australia 1992, 1993

Gave presentation Seminar on "Induction Furnace Electrical Fundamentals" to AFS Piedmont Chapter, 1993

12. Principal publications of last five years:

Coreless Induction Furnace Electrical Fundamentals Training Manual, 1993 & Article in AFS Transaction 1990 entitled "A New Coreless Induction Furnace Monitor"

13. Scientific and professional societies of which a member:

American Foundrymens Society (AFS)
1990 - 1994

14. Honors and awards:

Speaker Appreciation Award Presented 1993 by AFS

15. Specific program to improve teaching and 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.

CIM Installation - (3 hours/week)

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

Advisor, various university, college and department committees 5 hours/week)
Plan Control Panel Demonstrator - (1 hour/week)

18. Recent summer assignments not shown above:

None

Ferris State University
Electrical/Electronics Department

April 1, 1994

19. Any other pertinent information:

None

BIOGRAPHICAL DATA

1. Name Murry D. Stocking
2. Department: Electrical/Electronics
3. Age: 46
4. Academic Rank: Assistant Professor (Full-time)
5. Degrees: Electrical Engineering, Michigan
 Technological University
 1992

 20 credits earned toward masters in
 Vocational Education at Ferris State
 University
6. Number of years service on this faculty:

 11 years
7. Other teaching experience:

 None
8. Full-time industrial experience:

 Grand Transformers, INC.
 Beechtree and Marion
 Grand Haven, MI
 1976 - 1981
 Was design engineer custom designing
 transformers.

 Daverman Associates
 Monroe Avenue
 Grand Rapids, MI
 1973 - 1975
 Worked with REA co-ops doing load and rate
 studies.
9. Part-time industrial experience:

 None
10. Consulting work:

 Helped conduct training sessions for DDS
 Summer, 1989

April 1, 1994

Training of Turkish students, summer of 1991

11. Professional recognition:

Taken and passed first part of RPE exam.

12. Principal publications of last five years:

None

13. Scientific and professional societies of which a member:

Member of ASEE

14. Honors and awards:

None

15. Specific program to improve teaching and 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.

None

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

Advisor, various university, college and department committees (????? hours/week)

18. Recent summer assignments not shown above:

None

19. Any other pertinent information:

None

BIOGRAPHICAL DATA

1. Name Edward R. Stuart
2. Department: Electrical/Electronics
3. Age: 45
4. Academic Rank: Assistant Professor (Full-time)
5. Degrees: MS of Engineering
University of Michigan
1975

BS Electrical Engineering
University of Michigan
1970

Associate Pre Engineering
Grand Rapids Community College
1968
6. Number of years service on this faculty:

6 years
7. Other teaching experience:

University of North Dakota
Electrical Engineering
8. Full-time industrial experience:

Grand Haven Board of Light and Power
1981 -1984
Resident Field Engineer

Army's Arctic Test Center
1975 - 1976
Ft. Greely, Alaska
Test Engineer

Army's Electronic Proving Grounds
1973 - 1974
Ft. Huachuca, Arizona
Test Engineer

Arctic Test Center
1972 - 1973
Engineering Technician

April 1, 1994

9. Part-time industrial experience:

Belco of Greenville
1984

Drafter/detailer in job shop which designed
and built billet furnaces and associated
controls.

10. Consulting work:

University of North Dakota
1984 - 1987

Acted as consultant for CIBD - Assisted
private citizens and industry to develop
involving hospital applications and products.

Kenya

Assisted School in acquiring electrical
equipment.

1992 - 93

Assisted in assessing industrial needs for
training in the area of electronics.

1994

11. Professional recognition:

Awarded instructor award at Ferris State
University
1994

Nominated for distinguished instructor award
at University of North Dakota
1986

12. Principal publications of last five years:

None

13. Scientific and professional societies of which a member:

IEEE

Meet with local professional engineering
group

Former member of ASEE

14. Honors and awards:

None

April 1, 1994

15. Specific program to improve teaching and professional competence in which participated during the last five years:

Seminar on Sensors at ATC in Grand Rapids
TQM class at FSU
SPC seminar at FSU
IEEE Videoconference, "High Performance Data Communications"
IEEE Videoconference: "Workstations of the Future"
Sencore Tech School: "Switching Power Supplies"
CIE Tech School on VCR's

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

Health Advisory Committee (1 hour/week)
Coordination of acquiring CET test site status for FSU (5 hours total)
Curriculum Committee (1 hour/week)
Student Advising (2 hours/week)
Mission Statement Committee (1 hour week)

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

Assisted Habitat for Humanity in construction of house for disadvantaged family.

Instruct middle school student in technology.

participated in campus "We Care" program for assisting FSU students with personal problems.

Department United Way Representative.

Went on relief mission to Bosnia/Hercegovina 1993.

18. Recent summer assignments not shown above:

None

19. Any other pertinent information:

None

BIOGRAPHICAL DATA

1. Name James A. VanDenBerghe
2. Department: Electrical/Electronics
3. Age: 45
4. Academic Rank: Assistant Professor, Full Time
5. Degrees:
 - MSEE
Wayne State University
1990
 - BEET
Wayne State University
1979
6. Number of years service on this faculty:
 - 3 years
7. Other teaching experience:
 - None
8. Full-time industrial experience:
 - William Beaumont Hospital
Royal Oak, MI
1983 - 1990
Senior Biomedical Equipment Technician
 - Menominee County Lloyd Hospital
Menominee, MI
1982 - 1983
Director of Plant Maintenance
 - William Beaumont Hospital
Royal Oak, MI
1976 - 1982
Biodmedical Equipment Technician
 - Tektronix, Inc.
Farmington Hills, MI
1975-1976
Electronic Technician

Ferris State University
Electrical/Electronics Department

April 1, 1994

U.S. Navy
1967 - 1975
Electronics Technician

9. Part-time industrial experience:

None

10. Consulting work:

None

11. Professional recognition:

Registered Professional Engineer, State of
Michigan #39215
Certified Biomedical Technician
Certified Laboratory Equipment Specialist

12. Principal publications of last five years:

None

13. Scientific and professional societies of which a member:

IEEE, Member: including Education Society and
Engineering in Medicine and Biology Society

14. Honors and awards:

None

15. Specific program to improve teaching and professional
competence in which participated during the last five years:

Completed modules 1-6 for new faculty members
produced by the Michigan College's Consortium
for Faculty Development.

Attended Control Expo in Chicago, IL May 1991

Attended three-day ECAD Seminar, FSU, July
1991

audited:

EET 235 (8-bit microprocessor's), 1991

EET 335 (16-bit microprocessor's), 1992

EEET 310 (C-programming), 1993

April 1, 1994

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

Student advising and tutoring (2 hours/week)
Drug Abuse Task Force Committee
1993 - 1994
(.5 hours/week)

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

None

18. Recent summer assignments not shown above:

Taught EET 491 at AC Rochester, Flint, MI
August, 1991

19. Any other pertinent information:

U.S. Patent #4,503,859, Ambulatory Esophageal
Function and EKG Monitor (co-inventor)

Additional Electronics Training:

Capitol Radio Engineering Institute - Base program and
Communications elective, 1974

U.S. Navy Electronics Technician Class "A" School (39 weeks)

U.S. Navy Electronics Technician Class "B" School (48 weeks)

U.S. Air Force Precision Measuring Equipment School (15
weeks)

BIOGRAPHICAL DATA

1. Name Robert L. Willison
2. Department: Electrical/Electronics
3. Age: 52
4. Academic Rank: Professor (Full-time)
5. Degrees:
 - Associates Applied Science: Radio and Television Servicing
Ferris State University
1966
 - Associates Applied Science: Color Television Servicing
Ferris State University
1966
 - Associates Applied Science: Advanced Transmitter Servicing
Ferris State University
1968
 - Bachelor of Science Degree: Trade Technical Teaching
Ferris State University
1968
 - Bachelor of Science Degree: Electrical/Electronics Engineering Technology
Ferris State University
1986
 - Master of Arts: Media Education Broadcast Major
Central Michigan University
1971
6. Number of years service on this faculty:
 - 18.5 years Teaching
 - 4.5 years Technician
7. Other teaching experience:
 - None

April 1, 1994

8. Full-time industrial experience:

Rapid Cablevision; May 1973 - Sept. 1976;
Manger and Chief Technician

WOOD-TV; May 1977 - Sept. 1977 and May 1978 -
Sept. 1978; Broadcast Television Engineer.

WGVU-TV:
Summers 1979 - 1984
Broadcast Television Engineer

Ferris State University
1969 - 1973
Video & Audio Engineer

WCMU-TV
1967 - 1969
Assistant Chief Engineer.

9. Part-time industrial experience:

WBRN Inc.
1965 - Present
Assistant Chief Engineer

Electron Systems - Two-way Radio
1964 - Present
Consultant/Technician

WWTV & WWUP-TV
1965 - 1967
Television & Radio Engineer.

10. Consulting work:

National Aeronautics and Space
Administration; Lewis Research Center; July
1981; Design and Layout of cable television
distribution system; interfacing computers w/
mainframe.

National Aeronautics and Space
Administration; Lewis research Center; July
1982; Implementation and Proof-of Performance
of system designed previous year.

Nartron Industries; February 1988; consulting
w/speaker levels for voice recognition.

April 1, 1994

11. Professional recognition:

Lifetime General Radio-Telephone License w/
Ship Radar Endorsement; Federal
Communications Commission (no expiration)

12. Principal publications of last five years:

Technical Contributor for the text Electronic
Communications: Modulation and Transmission,
by Robert J. Schoenbeck, published by Merrill
Publishing Co.

13. Scientific and professional societies of which a member:

Member - Instrument Society of America (1986-
89)
Member - Society of Broadcast Engineers
Member - Society of Motion Picture and
Television Engineers (member by election)
Faculty Advisor - IEEE

14. Honors and awards:

None

15. Specific program to improve teaching and professional
competence in which participated during the last five years:

Automation - 89; Miami University
Internship Seminar; Grand Valley State
University
Radio control Seminar; ISA; Dow Library
Numerous Field Trips and Seminars
Electronic Teachers Technical Symposium

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

Administration of internship program
w/students and industry; 3-5 avg. hrs./week
Various University, College and Departmental
Committees (2-3 hours/week)
Student Advising (2-3 hours/week)

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

Summer Internship Program: 1986-1994; 20-30
avg. hrs/week

Ferris State University
Electrical/Electronics Department

April 1, 1994

18. Recent summer assignments not shown above:

Teaching Turkish Students troubleshooting and
communications; summers of 1991 and 1992.

19. Any other pertinent information:

None

FERRIS STATE UNIVERSITY
College of Technology
Electrical/Electronics Department

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for
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and
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advmember1.095
Revised 10/8/95

APPENDIX A

PROGRAM PROFILE

Program BSEET
Department Electrical/Electronics
College Technology

Degree BS

I. PURPOSE OF THE PROGRAM

- A.
 1. Provide skills and knowledge for employability
 2. Provide skills and knowledge to allow advancement within the electronics profession
 3. Serve students through various outreach activities
 4. Provide experience and practical applications through lecture/lab based instruction
 5. Provide means to allow students to develop a sense of professionalism
 6. Provide training and educational services for business, industry, and education
- B. The program is compatible with the role and mission statement of FSU in that we provide the opportunities, at the program level, for students to reach their highest potential in developing those skills required to be of value to themselves and employers.
- C. This program is integrated/coordinated with the Industrial Electronics Technology program in the typical 2+2 arrangement at Ferris.
- D. This program is integrated/coordinated with programs at other institutions through articulation agreements. This program articulates with all 23 community colleges that offer electronics associate degrees as well as with several private colleges and colleges from other states. Nearly 60% of the enrollment in the BSEET degree is comprised of transfer students.
- E. This program serves community, state, and nation by providing graduates with a well rounded education and a firm foundation in the electrical/electronics fundamentals and advanced topics which insures that they will be productive individuals from the first day on the job through their life-time careers.

II. RESOURCES OF THE PROGRAM

- A. Personnel
 1. See Appendix
 2. FTE overload - none to-date
 3. Off-campus programs: ATC in Grand Rapids. A portion of an FTE each semester and involves approximately four of the faculty in the department.

4. Administration: MSOE, 1995, FSU; BSEE, 1967, MTU; AAS, 1960, Alpena CC; PE in the State of Michigan, 1971. Worked seventeen years as an electrical engineer for Consumers Power Company.
5. Support Staff: One full time secretary II and one full time technician, BS degree.
6. Student assistance: Three students assistance; one assists the secretary on a weekly basis, two are used as lab assistants for open labs two evenings each week.
7. Advisory Committee:

See Appendix

B. Instructional Resources

1. Facilities and equipment available: There are six laboratories, one is a computer lab which houses SPARC 10 computers with Mentor Graphics software and was funded by an NSF grant, the remaining five labs are equipment labs, each is equipped with computers and standard bench equipment such as oscilloscopes, power supplies, function generators, DMM's, VOM's, etc. One lab is equipped with "table-top factories" and Allen-Bradley programmable logic controllers. One lab is equipped with motor trainers.

Most equipment is relatively recent, however, there are several pieces that are no longer produced or supported by the manufacturer. These pieces are functional but will be replaced as funds are made available to do so.

2. S&E Budget: FY 92-\$23,673; FY 93-\$27,819; FY 94-\$22,947; FY 95-\$33,570.
3. Equipment budget: has been pretty thin - 1994 - \$11,000 for computers for the automation lab; 1995 - \$16,000 to increase the number of computers available for student use; 1994 - \$15,000 toward the NSF grant.
4. Gifts and grants: gifts to the department have been primarily in-kind. Monetary gifts have been approximately \$5000 total in the past five years - that includes gifts from faculty, staff, friends, and industry. In 1994 we were awarded a \$96,000 NSF grant for which NSF funded \$48,000 and FSU/Electrical/Electronics Department has funded the remainder. We received an \$18,000 donation of electronic components from Saturn Electronics and Engineering in November, 1994. We received \$75,000 worth of hardware and software for on-line programming. In addition Allen-Bradley has donated many small pieces of control equipment over the past several years. Intel, Motorola, Mentor Graphics, Microsim, SF Electronics, and others have donated software, manuals, equipment, and

components.

5. There has not been a designated travel budget. The program supports travel for faculty and administration from the S&E budget when the need arises.
6. Professional development has not had a budget in the recent past. In the Fall of '95 the department received (from the Dean of the College of Technology) \$4000 for professional development. Professional development has been funded, when possible, from the S&E budget, with occasional help from the Dean and small Timme grants.
7. Library resources are adequate in the books, TAC/ABET suggested that we needed more magazines, periodicals, and journals. That is being worked on.

C. Faculty activities other than instruction:

1. Committee involvement: all program faculty serve on one or more department, college, and university committees.
2. Professional organizations: All faculty belong to one or more professional groups such as; Society of Professional Engineers (SPE), Instrument Society of America (ISA), American Society of Engineering Education (ASEE), Institute of Electrical/Electronics Engineers (IEEE).
3. Publications: None to-date.
4. Consulting: Many of the faculty have done consulting on an occasional basis. Several do some consulting each Summer.

III. ENROLLMENT, RECRUITMENT, AND RETENTION

A. Enrollment trends for the last five years

1. Student credit hours/FTE (Total department):

<u>1990-91</u>	<u>1991-92</u>	<u>1992-93</u>	<u>1993-94</u>	<u>1994-95</u>
342	326	350	288	304

2. Majors (on/off campus):
(includes only 3rd and 4th year)

<u>1991-92</u>	<u>1992-93</u>	<u>1993-94</u>	<u>1994-95</u>	<u>1995-96</u>
	56/12	69/12	68/10	69/10

3. Graduates (on/off campus):

<u>1990-91</u>	<u>1991-92</u>	<u>1992-93</u>	<u>1993-94</u>	<u>1994-95</u>
23/0	18/0	18/0	28/1	23/1

4. Graduates employability: Graduates are employed by the

automotive companies, aerospace companies, manufacturing, steel, and computer related companies. Starting salaries ranged in the middle to upper \$20,000's until May 1995 when salaries ranged from \$32,00 to \$42,000.

5. Graduates promotability and advancement: Since 1986 when the first BSEET graduates were produced we have had "spotty" feedback from graduates. Those that keep in touch have done very well with a number of graduates holding managerial positions such as Manager of Engineering, Director of Manufacturing, etc.
6. Program capacity: Capacity was established at 36 incoming juniors each Fall based on laboratory equipment originally purchased for the program as well as physical plant. During the Summer '95 there were changes in room assignments that now allow for more than 36. We can now accommodate 50 new students in the laboratories. (This is off-set by the lower enrollment in the IET program which is capped at 84. Recent enrollments have been running at 40 to 50 freshmen).
7. Accepts/enrollees ratio: There are no records on this data, however, experience has been that we enroll every student accepted into the BSEET program.

There are recent signs of increased interest in electronic. Admits for Fall '96 show an increase over the recent past.

B. Recruitment

1. Recruitment activities: On-going communications between the department head and all the community colleges in Michigan that offer an associate degree in electronics. Articulation arrangements with post-secondary technical schools such as ITT Technical Institute and National Education Center, have been put in place. We also articulate with Ivy Tech of Indiana.

The department mails recruiting posters with mail-back post cards to the majority of the high schools in the state, to the career and technical centers, and to the community colleges. This poster is paid for from the department S&E.

Each year the department requests the ACT/EOS listing of all eleventh graders in the state who have taken the ACT and indicated any field of electronics as an interest. The department mails from 600 to 1000 letters each Fall to these groups of students and includes FSU as well as program information.

Visits are made to high school career days.

Currently efforts are being made to have the University

Advancement office assist the department in program promotion and recruiting.

2. Program interest: Program cap was established at 36 when the new laboratory was installed in 1988. Actual class list numbers do not agree with "official" registration in the BSEET. In 1992-93 and 1993-94 the actual number of

students enrolled in the junior classes exceeded 40 which was over the published cap. In the past two years, 1994-95 and 1995-96, the enrollment in the junior classes has been 30 - 32 students.

Our greatest "feeder" to the BSEET program has been the community colleges. With enrollments down in electronics programs in most of the community colleges in Michigan as well as many of the schools around the country we have seen a slight decline in enrollments as well.

C. Retention

1. Retention Problems: Since the BSEET program is a 2+2 it seems appropriate to address retention at all levels, freshman through senior. Freshman retention runs about 50% from the first semester to the second semester. A great part of this problem is the number of students who qualify according to high school gpa and ACT scores, but, are not committed, motivated, or prepared to work to the extent needed to be successful. The retention of pre-technical students has historically been zero. At the sophomore level retention is nearly 100%. By this time the students are determined to at least complete their associates degree. From the sophomore to the junior year the program loses approximately 60% of the students, 30% exit and 30% choose other program areas to complete their BS degrees. Retention in the junior and senior years is nearly 100%. Those juniors that have difficulty tend to remain at the university and the program even though it may take an extra year to complete the requirements.
2. Resolving retention issues: The department is trying an experimental course for pre-techs in an effort to retain more of them in the program. This first effort seems to be meeting with varied success. For the most part, the course, EEET290, seems to lack the components that instill the desire to succeed on the students part. We will attempt another try with some changes in Fall '96.

Freshman retention has always been a challenge and will continue to be a challenge considering our cliental is typically in the top 50 percentile of graduating high school seniors. Some effort has been made on the part of faculty to make the student feel more a part of Ferris. Faculty have changed teaching approaches in an effort to give the less prepared student a greater chance of

success, i.e. repeat exams, faculty lead study sessions, extra long exam periods. The students that avail themselves of these opportunities are the ones that rank at the top of the class in the first place.

3. Student organizations: the Institute of Electrical and Electronic Engineers (IEEE) student chapter, represents the students in the E/E department. Incoming freshmen and transfer students are encouraged to join the IEEE. The IEEE conducts meetings, field trips, and social activities for its members and guests. The department feels this is one way new students can begin to feel they are a part of the program.
4. Student advising: each faculty in the department has program advisees. Faculty maintain files in their offices and track the progress of the students through the program. Faculty advisors also help students that may be having difficulty in any particular course.

IV. EFFECTIVENESS OF THE PROGRAM

A. Curriculum

1. Graduation requirements: students must meet the institutional requirements in Communications, Mathematics, Scientific Understanding, Social Awareness, and Cultural Enrichment. Since the BSEET program is TAC/ABET accredited the Mathematics and Scientific Understanding requirements of the institution are exceeded. The BSEET curriculum is comprised of 136 semester credits including a 4 credit internship between the junior and senior year.
2. See the Appendix for the IET and BSEET curriculum check sheets.
3. Curriculum currency: the curriculum is kept current through input from the Industrial Advisory Committee, TAC/ABET review for accreditation, feedback from graduates of the program, surveys of graduates, and faculty input. Faculty subscribe to a multitude of trade periodicals, attend workshops and seminars, and maintain contact with colleagues around the country.

B. Quality of the program

1. Quality demonstrated: program is TAC/ABET accredited. Employers of graduates and interns have commented on the quality of the students and the program.
2. Quality of instruction is the professional responsibility of the faculty. Faculty are encouraged by the department head to constantly improve quality, attend seminars and workshops on instruction, and refer to literature on quality instruction forwarded by the department head.

awarded the department.

V. ACTIONS TAKEN AND FUTURE PROSPECTS

A. Assessment of actions taken

1. Measures taken to correct weaknesses and emphasize strengths have been:
 - a. to make upper management aware of the need to promote the program.
 - b. to develop within the department advertising material that can be sent to high schools and community colleges.
 - c. planned, gradual replacement of obsolete equipment.
 - d. promote our newly acquired TAC/ABET accreditation.
 - e. pursue development of training and education through the TTC to make more people aware of our program and our ability to serve industry needs.
2. Results in response to measures executed:
 - a. Enrollment is holding steady - although we expect to see an increase in the next year or two.
 - b. A small amount of laboratory equipment has been replaced with more to be replaced in 96/97.

B. Future measures needed to enhance the program

1. The one threat, the origins of which seem to be somewhat nebulous, is the decline in interest in electronics. This phenomenon seems to be prevalent throughout the country. There are recent signs of increased interest, but, not an increase in motivation.

The opportunities are that as more electronics programs are closed our program will become more in demand. Likewise, as we continue our TAC/ABET accreditation and continue to bring our program closer to today's technology (a feat in itself), AND get the word out that we have an excellent program with good placement we will see good solid enrollment in the program.

- b. The single most important event that will enhance the program is promotion. There simply must be more money spent to get our story out where it counts.