FERRIS STATE UNIVERSITY
MECHANICAL ENGINEERING TECHNOLOGY

August 13, 2015

Academic Program Review Council
Academic Affairs
Ferris State University

Re: Academic Program Review Submittal for Mechanical Engineering Technology

Dear Council Members:

The primary submittal for the AAS and BS programs in Mechanical Engineering Technology is our "ABET Self-Study Report for the Mechanical Engineering Technology B.S. and A.A.S. Programs." The ABET Self-Study follows this transmittal. Two supplemental letters follow.

The faculty in Mechanical Engineering Technology appreciate your service to the university and look forward to your review.

Respectfully,

Chuck Drake
(Outgoing) Program Coordinator, Mechanical Engineering Technology

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WHERE INNOVATION BEGINS.....

ABET
Self-Study Report

for the

Mechanical Engineering Technology

B.S. and A.A.S. Programs

at

Ferris State University

Big Rapids, MI

June 2015

CONFIDENTIAL

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NOTE TO READER. In order to use automated numbering within Word™, this self-study is divided into sections starting with section 1 Background Information. Consequently section 2 in the report deals with Criterion 1, section 3 with Criterion 2. The reader will notice this "offset" in table and figure numbers throughout the report. It is not intended to be distracting.

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Program Self-Study Report
for
ETAC of ABET
Accreditation or Reaccreditation

1. BACKGROUND INFORMATION

A. Contact Information

List name, mailing address, telephone number, fax number, and e-mail address for the primary pre-visit contact person for the program.

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B. Program History

The Big Rapids Industrial School was founded in 1884. In that same year, the name was changed to the Ferris Industrial School. In 1894, the first trade program was offered under the new Telegraphy Department. The name of the school was changed again in 1899 to Ferris Institute. Starting in 1946, there raised a demand for continued education by veterans of World War II. In that year, a broad program of trade and industrial education was launched. In 1950, Ferris Institute ceased to be a private institution and became Ferris State College. In 1956, the Trade and Industrial Division was established and 16 programs were offered. The Trade and Industrial Division and the Collegiate Technical Division merged to form the School of Technical and Applied Arts in 1964. Four years later, the School reorganized into six departments: Automotive, Construction, Electrical and Electronics, General, Graphic Arts and Industrial.

The Mechanical Engineering Technology (MET) program was launched in 1970; the first graduates completed their studies in May 1972. This was the first engineering technology program offered at Ferris. At that time, the majority of the programs in technology ran four quarters and certificates were granted. These certificates included areas such as Welding, Machine Tool, Drafting, Auto Body, Auto Machine, Auto Service, along with Refrigeration, Heating and Air-Conditioning Service, and others. There were several other associate degrees, but not in engineering technology: Building Construction Technology, Highway Technology, Surveying, Topographical Drafting Technology, Industrial Electronics Technology, Plastics Technology, Cosmetology, and others.

a. In 1977, a BS program in Manufacturing Engineering Technology was initiated. This allowed AAS MET graduates to ladder into a four-year degree program.

b. In 1988, a BS program in Product Design Engineering Technology (PDET) was added. This program attracted many of the AAS MET graduates. Many have achieved success in their careers with the combination of AAS MET and BS PDET degrees.

c. Throughout the 1990's, AAS MET students, alumni, prospective students, and potential employers all expressed interest in a BS MET program. Preliminary exploration began in the fall of 1998 and a formal proposal was approved in April 2000.

d. The first classes for the BS MET program were offered in the fall of 2001. The number of students starting the AAS MET has increased steadily since the inception of the BS degree.

e. Following a visit in Fall 2003, the AAS in Mechanical Engineering Technology was re-accredited and the BS in Mechanical Engineering Technology received initial accreditation. An interim report was required.

f. The MET programs underwent the universities internal Academic Program Review in Fall 2004. The programs received an “Enhance” rating with the recommendation that program faculty be increased from three to four, funding increased, and appropriate lab space be provided. This was in part due to the program's growth, centrality to the university's mission, and low cost.

g. Faculty and administration prepared and submitted an Interim Report to TAC of ABET in July 2005.

h. Following a national search, Brian Brady was hired as a fourth faculty member in MET in Fall 2006.

i. The AAS and BS programs went through their last general review for TAC of ABET accreditation in Fall 2009. The result was an interim report. Initial findings cited the process to determine educational objectives and adequacy of facilities. Findings included the continuous improvement plan and institutional support

j. The programs went through the internal Academic Program Review process in Fall 2010. The programs again received the "Enhance" rating with the recommendation for additional lab space.

k. With the retirement and resignation as program coordinator by Thomas Hollen in May 2012 the faculty in MET was reduced to three people. His position was posted in June 2012 and was to be primarily for a faculty with interest in the new Energy Systems Engineering program. No suitable candidate was found leaving only three faculty in MET. An adjunct was hired to teach a lower level MECH class. A successful search during the following year resulted in the hiring of Dr. Ali Siahpush as the fourth MET faculty.

l. An Interim Report was submitted to ABET in June 2011.

m. A fifth tenure track position was authorized in November 2014. The search produced several attractive candidates. Two have declined offers while a third accepted.

n. In May 2015 Dr. Siahpush submitted his resignation for personal reasons. An open position remains with the search continuing.

o. Since its inception, the BS MET program has graduated 191 students through the spring of 2014.

College Organizational Changes

During the period since the last ABET review, the college and programs have gone through considerable change. At the beginning of the accreditation period, the college was organized into 12 departments, which included: Architectural Technology and Facilities Management; Automotive; Construction Technology & Management; EET & CNS; Heavy Equipment; HVAC/R, Manufacturing; Mechanical Design, Plastics & Rubber; Printing and Imaging

Technology; Surveying Engineering; and Welding Engineering Technology. The MET AAS and BS programs were part of Mechanical Design Department.

Beginning in the Fall 2009, the college was again reorganized. Four schools were established with one that is now called the School of Computing and Engineering Technology (SECT). This school includes: Mechanical Engineering Technology, Electrical/Electronic Engineering Technology, Energy Systems Engineering, Surveying Engineering, and Computer Networks and Systems. The initial Interim Director of the School was Professor Thomas Hollen, who also served as Program Coordinator for the Mechanical Engineering Technology programs and Energy Systems Engineering program. Debbie Dawson was hired as permanent director beginning Fall 2010. See Figure D-1 College of Engineering Technology Organization in Appendix D.

As mentioned above, Tom Hollen served as MET and Energy Systems Program Coordinator until his retirement in May 2012. Chuck Drake replaced him at that time and will serve until August 2015. His replacement is Prof. Randy Stein.

The MET programs' curriculums have undergone changes during this period. These changes were due to the input from the Advisory Board, student assessments of courses, industrial input from Internship visits, and the faculty's continuous evaluation of the programs and courses.

A list of the significant curriculum change proposals for the programs follows:

> MET Internship Change to Letter Grade, Approved December 14, 2011
> This proposal, following a focus group meeting with students and faculty, changed MECH 393 Industrial Internship from Credit/No Credit to a letter grade.
>
> MET Minor Curriculum Changes, Approved January 26, 2012
> This proposal changed titles for MECH 122 and 322 to Computer Apps for Technology 1 and 2 respectively. Also prerequisites were modified so that higher level math and physics would not be rejected by the Banner registration system; e.g. change from MATH 126 to MATH 120 or MATH 130 or MATH 216 or MATH 220.
>
> MET Prerequisites Update, Approved November 30, 2015
> This proposal established the requirement of a grade of C- or higher in all MECH courses that are prerequisites for subsequent MECH courses.

C. Options

There are no options for the Mechanical Engineering Technology programs.

Students in the BS MET program are required to take at least six semester hours of advisor approved technical electives. Some choose to direct these electives towards certificates or minors.

D. Program Delivery Modes

The programs courses are offered in traditional lecture/lab format on campus only during week days and evenings. MECH 340 Statics and Strength of Materials is available in Grand Rapids, Michigan, where it is offered as a service course for other programs. Most MECH and related courses are web-enhanced. Web enhancement may include gradebook, notes, handouts, exercises, recorded lectures, and supplemental information for classes.

E. Program Locations

The full AAS and BS MET programs are only offered on campus in Big Rapids, Michigan.

F. Public Disclosure

Provide information concerning all the places where the Program Education Objectives (PEOs), Student Outcomes (SOs), annual student enrollment and graduation data is posted or made accessible to the public. If this information is posted to the Web, please provide the URLs.

The Program Education Objectives (Early Career Objectives) and Student Outcomes are published in the on-line catalog and on the website for both program. :

This html link below finds both. Additionally hyperlinks to pdf files, located on the programs DVD, of the Objectives page and of the Outcomes page are provided.

http://www.ferris.edu/HTMLS/colleges/technolo/ceems/mece/Program-Objectives.htm

DVDFilesMECH\Catalog\MET Program Early Career Objectives.pdf

DVDFilesMECH\Catalog\MET Program Outcomes.pdf

Annual student enrollment and graduation data is presently available in an annual searchable pdf file called the Ferris Factbook.

DVDFilesMECH\Factbook\FactBook14-15.pdf
http://www.ferris.edu/HTMLS/admision/testing/factbook/FactBook14-15.pdf

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

Summarize the Deficiencies, Weaknesses, or Concerns remaining from the most recent ABET Final Statement. Describe the actions taken to address them, including effective dates of actions, if applicable. If this is an initial accreditation, it should be so indicated.

The Summary of Accreditation Action and Final Visitation Statement indicated that continuation of accreditation past September 30, 2012 for MET programs is dependent on responses to the following findings:

1. Program Weakness: Educational Objectives, Determination and Evaluation

2. Program Concern: MET Facilities

3. Program Concern: Continuous Improvement Plan

4. Program Concern: Institutional Support

5. Observation: Distribution of Assessment, Evaluation, and Improvement Activities.

The Program responded to the Weakness and Concerns above in its 208-page Interim Report submitted in June 2011. Very briefly:

1. Evidence of the process used to review and determine educational objectives was presented.

2. Additional lab space, designated as the "Multiple Disciplinary Project Room" was discussed.

3. Documentation on the program's CIP was presented.

4. The College's program support procedures are discussed. MET received an increase in budget and was able to send faulty test equipment to manufacturer for repair.

In its Final Interim Report Statement dated August 17, 2012, the Engineering Technology Accreditation Commission of ABET:

1. Reduced the Program Weakness on Educational Objectives to a Concern

2. Left the 2nd Concern regarding facilities as a Concern.

3. Left the 3rd Concern regarding support also a Concern

The findings were similar for both the AAS MET and BS MET program.

GENERAL CRITERIA

2. CRITERION 1. STUDENTS

For the sections below, attach any written policies that apply.

A. Student Admissions

Admission is open to high school graduates who demonstrate the academic preparedness, maturity, and seriousness of purpose with backgrounds and interest in math and science. All incoming freshmen are required to submit ACT or SAT test scores along with official high school transcripts. Transfer students are required to submit official transcripts from all previously attended colleges as well as official high school transcripts and test scores. Students fulfilling both university and program entrance requirements will be granted admission into the Mechanical Engineering Technology Program.

Admissions Requirements for AAS in Mechanical Engineering Technology

Freshmen are admitted into the AAS Mechanical Engineering Technology (AAS MET) program prior to laddering into the BS MET program. Minimum requirements for acceptance into the AAS program include:

- meet university admission requirements
- high school GPA of 2.5
- minimum ACT Composite score of 18
- math placement in MATH 116 Intermediate Algebra and Trigonometry (math ACT 19 or math SAT 460)
- 2.0 GPA transfer (college) students

This information can be found in the university catalog:

DVDFilesMECH\Catalog\MET AAS Course Catalog.pdf

or

http://catalog.ferris.edu/catalog/2014-2015/program/2942

Pre-technical status*:*

Applicants who meet University admission requirements but lack the mathematics background for placement in MATH 116 or higher are admitted into a Pre-Mechanical Engineering Technology status. Upon successful completion of MATH 110 Intermediate Algebra, students are eligible to enter the AAS MET Program.

Students seeking to transfer into the second year of the program:

Transfer students are required to submit official transcripts from all colleges attended as well as official high school transcripts and test scores. Students fulfilling both university and program entrance requirements will be granted admission. Students should have:

- at minimum, math through pre-calculus
- a college-level course in physics equivalent to PHYS 211 or PHYS 241.
- courses in engineering graphics, CAD and computer applications are recommended.
-

More information appears in section C. Transfer Students and Transfer Courses

Admissions Requirements for BS in Mechanical Engineering Technology

Minimum requirements for acceptance into the BS MET program include:

- completion of an AAS degree in Mechanical Engineering Technology or equivalent with an overall GPA of 2.5
- math GPA of 2.5 in classes through calculus
- MECH GPA of 2.7
- competency in MATH 216 or 220 (Calculus 1)

This information can be found in the university catalog at:
DVDFilesMECH\Catalog\MET BS Course Catalog.pdf
or
http://catalog.ferris.edu/catalog/2014-2015/program/2956

B. Evaluating Student Performance

Summarize the process by which student performance is evaluated and student progress is monitored. Include information on how the program ensures and documents that students are meeting prerequisites and how it handles the situation when a prerequisite has not been met.

Before a student can register for classes in any semester, he/she must have a registration hold cleared by his/her advisor within the Banner administrative software system. This is typically done with a face-to-face student-advisor meeting each semester. This process allows each advisor to monitor the progress of the student and his/her performance in the previous semester.

If, during the student visit, the advisor sees that a student is having difficulty, they may advise the student to take courses that will strengthen their educational base. On occasion, an advisor may ask the student to repeat a course. Students may not take more than 18 credits without the permission of the advisor. In addition, those students who are on academic probation must also have approval from the academic advisor before they are allowed to take more than 14 credit hours in a semester. A student may not drop a currently enrolled course without the approval of the academic advisor.

To ensure that students meet the proper pre-requisites, the registration software Banner will not allow a student to register for a class unless all of the pre-requisites have been met. The criteria may be overridden by the School secretary upon notice by the advisor and/or affected faculty member should special circumstances occur.

C. *Transfer Students and Transfer Courses*

Summarize the requirements and process for accepting transfer students and transfer credit. Include any state-mandated articulation requirements that impact the program.

Transfer students apply for admission in the same manner as described above. They are then required to have official transcripts mailed from their previous educational institution(s) to the FSU Admissions and Registration Office.

Once the transcripts have been received, the transcripts are evaluated. The Transfer Center, with assistance from academic programs, maintains a list of college equivalencies. The Transfer Equivalency web page allows the user to choose an institution and then choose course subjects listed by prefix. If the institution has already identified equivalencies, those will be displayed. Below is an example for math equivalency at a Michigan community college.

FERRIS STATE UNIVERSITY

Back to Select Institution | Back to Select Subject |

Transfer Credit Equivalencies (TCE)

North Central Michigan College				Ferris State University					
	Subj	**Crs**	**Title**		**Subj**	**Crs**	**Title**	**Credits**	**Attributes**
	MATH	090	Pre-Algebra		MATH	010	Fundamentals of Mathematics	0	
	MATH	100	Mathematical Reasoning		MATH	117	Contemporary Mathematics	4	Quantitative Skills
	MATH	101	Math for Elem Teachers I		MATH	218	Math for Elementary Teachers 1	3	
	MATH	102	Math For Elem Teachers 2		MATH	219	Math for Elementary Teachers 2	3	
	MATH	110	Beginning/Intermediate Algebra		MATH	110	Fundamentals of Algebra	4	
	MATH	112	Beginning/Intermediate Algebra		MATH	115	Intermediate Algebra	3	Quantitative Skills
				And	MATH	1--	MATH General Credit 100 Level	1	
	MATH	114	Liberal Arts Mathematics		MATH	117	Contemporary Mathematics	3	Quantitative Skills
	MATH	120	Intermediate Algebra		MATH	115	Intermediate Algebra	3	Quantitative Skills
				And	MATH	1-Q	MATH 100 Lvl Gen Cr-Quant	1	Quantitative Skills
	MATH	125	Math-Elementary Teachers I		MATH	218	Math for Elementary Teachers 1	3	
	MATH	126	Math-Elementary Teachers II		MATH	219	Math for Elementary Teachers 2	3	
	MATH	130	College Algebra		MATH	130	Adv Algebra-Analytical Trig	4	
And	MATH	140	Trigonometry	And	MATH	1-Q	MATH 100 Lvl Gen Cr-Quant	4	Quantitative Skills
	MATH	130	College Algebra		MATH	1-Q	MATH 100 Lvl Gen Cr-Quant	4	Quantitative Skills
	MATH	140	Trigonometry		MATH	120	Trigonometry	3	
				And	MATH	1-Q	MATH 100 Lvl Gen Cr-Quant	1	Quantitative Skills
	MATH	150	Analytic Geometry/Calculus I		MATH	220	Analytical Geometry-Calculus 1	5	
	MATH	210	Analytic Geometry/Calculus II		MATH	230	Analytical Geometry-Calculus 2	5	
	MATH	215	Analytic Geometry/Calculus III		MATH	320	Analytical Geometry-Calculus 3	3	
				And	MATH	3-Q	MATH 300 Lvl Gen Cr-Quant	1	Quantitative Skills
	MATH	225	Differential Equations		MATH	330	Differential Equations	3	
	MATH	235	Linear Algebra		MATH	322	Linear Algebra	3	
	MATH	297	Special Topics		MATH	2--	MATH General Credit-200 Level	3	
	MATH	299	Independent Study		MATH	2--	MATH General Credit-200 Level	1	

Back to Select Institution | Back to Select Subject |

Figure 2-1. Sample Transfer Equivalencies

The College reviews transcripts and posts equivalencies on the transcripts of transfer students.

If equivalencies have not been established, students and/or advisors may request equivalency evaluations from appropriate academic units.

Students and faculty can check the status of transfer equivalencies within the student's record using the Banner (MyFSU) computer system or MyDegree (DegreeWorks).

Students can transfer their general education requirements on a course by course basis. Additionally, if the school they attended prior to Ferris State University was a party to the Michigan Association of Collegiate Registrars and Admissions Officers (MACRAO) Transfer

Agreement, transfer students may complete a majority of their general education coursework at a community college. A copy of the Academic Affairs Policy Letter on the MACRAO Transfer Policy dated 10/8/08 is found on the DVD supplied by the program. DVDFilesMECH\Academic Policies\MACRAO_Academic_Affairs_Policy_Letter_Final_2_20_15.pdf

The Academic Affairs Policy Letter on Policy on Transfer Credits for Various Grades, Letter 01:7 dated December 11, 2001 is also included on the DVD. Briefly, a grade must be C or higher for a student to earn transfer credit. DVDFilesMECH\Academic Policies\Academic Affairs Policy Letter on Transfer Credits for Variouis Grades.pdf

Additionally the program prepared transfer guides for most Michigan community colleges. These guides identify at least 60 semester hours that can be taken prior to transferring to this institution. Upon acceptance, the program coordinator or advisor work out a semester by semester plan to optimize the transfer students time on campus. A link and sample follows.

DVDFilesMECH\TransferGuide\Northwestern-MI-College-MechET.pdf

http://www.ferris.edu/HTMLS/colleges/university/transfer/Articulation/mcc/NorthwesternMichiganCollege/guides/COET/Northwestern-MI-College-MechET.pdf

FERRIS STATE UNIVERSITY

Mechanical Engineering Technology

Bachelor of Science Degree

Northwestern Michigan College

Transfer Guide

The Mechanical Engineering Technology program prepares students for a broad range of occupations and challenges. Beginning with foundation courses in math, applied science, CAD, manufacturing processes and communication, students move on to the applied engineering courses that give them a solid technical background for their careers. Students develop strong analytic and problem-solving skills. Their understanding of the principles taught in the classroom is enhanced with many hands-on labs and real-world applications provided by faculty with extensive industrial experience.

General Admission Criteria

There are several ways to use the community college as a start for the BS in Mechanical Engineering Technology. One option would be to take essential math and science courses, especially pre-calculus and Physics 1, at the community college then transfer after 1-3 semesters. A second option, shown below, would include completing at least four semesters at the community college and taking as many math, science, technology, and general education credits as could be applied. To transfer to Ferris State, students must have an over GPA of 2.00. Note that only classes with grades of C or better (not C-) will transfer to Ferris State. Official transcripts from all accredited colleges/universities must be submitted with the Ferris application. Financial Aid may be available and may include concurrent admission at both institutions.

Course Requirements

Northwestern Michigan College

Course	Ferris Equiv.	Northwestern Michigan College Course Titles	Cr. Hrs.
CIT 100	MECH 122	Computer Apps 1 for Technology	2
EGR 113	ETEC 140	Engineering Graphics	3
ENG 111	ENGL 150	English 1	3
ENG 112	ENGL 250	English 2	3
MATH121*	MATH 116	Intermediate Algebra	4
MATH122*	MATH 126	Adv. Algebra and Analytical Trig.	4
MATH 141	MATH 220	Analytical Geometry and Calculus 1	4
MATH 142	MATH 230	Analytical Geometry and Calculus 2	4
CHM 150,150R	CHEM 114	Introduction to Chemistry	4
PHYS 121	PHYS 211	Introductory Physics 1	4
PHYS 122	PHYS 212	Introductory Physics 2	4
COM 111	COMM 121	Public Speaking	3
EET 102	MECH 111	MET Seminar	1
MFG 103	MFGT 150	Manufacturing Processes	2
NMC	*VARIES*	Social Awareness Elective	9
NMC	*VARIES*	Cultural Enrichment Elective	9
		Total Northwestern Michigan College Credits	**63**

* MATH There may be several options in math that lead up to calculus. The equivalents shown above are not exact matches. Consultation with a counselor at the community college is recommended.

Student transferring to Ferris with the Michigan Transfer Agreement (MTA) and entering a degree program will have met a 30-hour block of lower-level general education course. However, this does not exempt students from completing program specific prerequisites of higher-level general education course requirements. Students should contact their advisor regarding classes that meet the MTA.

Ferris State University

Course	Ferris Course Titles	Cr. Hrs.
EEET 201	Electrical Fundamentals	3
ENGL 311	Advanced Technical Writing	3
MATL 240	Intro to Material Science	4
MATL 341	Material Selection – Metals	3
MECH 211	Fluid Mechanics	4
MECH 212	Kinematics of Mechanisms	2
MECH 222	Machine Design	4
MECH 223	Thermodynamics	3
MECH 311	Finite Elem Analysis/Modeling	2
MECH 322	Computer Apps 2 for Technology	2
MECH 330	Heat Transfer	3
MECH 332	Mech.Measurements/Mechatronics	3
MECH 340	Statics and Strength of Materials	4
MECH 341	Statics and Strength of Mat'ls Lab	1
MECH 360	Dynamics	3
MECH 393	Industrial Internship	4
MECH 421	MET Senior Lab	4
MECH 440	Noise and Vibrations	3
MECH 499	Senior Project	3
MFGE 341	Quality Science Statistics	3
MFGE 423	Engineering Economics	2
Main Campus, or possibly NMC	Technical Electives (see FSU advisor)	6
	Total Ferris Credits	**69**
	Credits Required for Degree	**132**

Contact Information

Big Rapids Campus
Mechanical Engineering Technology
http:/www.ferris.edu/mech
mech@ferris.edu
231-591-2755
www.ferris.edu/transferservices

Figure 2-2. Sample Transfer Guide for a Community College, 1st page shown

In addition, articulation agreements for technical and vocational programs statewide are available to students with easy-to-find course translations at the following FSU website:

http://www.ferris.edu/HTMLS/colleges/university/transfer/precollege/hsarticulation/statewideagreements/secondary_articulation.htm

D. Advising and Career Guidance

Admissions counselors, educational counselors, program faculty, and departmental staff are available to provide services to prospective and enrolled students. Each faculty is assigned students as they enter the program. Every student has an Academic Hold placed on their records each semester. This requires the student to meet with a faculty member, or advisor, to have the hold removed.

In addition to providing academic counseling, educational counselors in the Educational and Career Counseling Center (ECCC) help students to identify and overcome obstacles to their academic success through the identification of both learning preferences and an individual's approach to the college learning experience. ECCC also offers assistance in making career choices. While finding the right career depends on several factors, two strong influences are personality and interests. Students can receive information in these areas by completing the Myers-Briggs Type Indicator and the Strong Interest Inventory through the ECCC. A licensed counselor interprets the results with the student and provides information on careers that are aligned with the individual's personality, interests, values, and skills.

Faculty in each program area for the College of Engineering Technology are assigned students to advise. Students are required to see their faculty advisor at least once per semester before registering. Also they are required to review progress and status prior to applying for graduation. All students at Ferris State University are assigned an academic advisor within a few weeks of their first semester on campus. In the College of Engineering Technology, each tenured and tenure-track faculty has advisees after their first year of employment. New faculty receive training in advising. MET faculty advise students in the MET programs and those in the Energy Systems Engineering program. Students are provided with the official curriculum and program check sheet prior to or at first enrollment in the program. They are expected to be aware of all published graduation requirements. The advisors are there to help students complete the requirements of the program. However, it is the responsibility of the students to ensure that they successfully complete all the requirements of the program.

Students and faculty can also track student progress through the program using software from Degreeworks™ called MyDegree. The software keeps track of the check sheet maintained by the program.

E. Work in Lieu of Courses

Summarize the requirements and process for awarding credit for work in lieu of courses. This could include such things as life experience, Advanced Placement, dual enrollment, test out, military experience, etc.

Credit for life experience or military experience is not given per se.

Students do have the opportunity to obtain credit by exam in two different ways. First, they can take a CLEP (College Credit-By-Exam Program) test, which evaluates a student's ability based on prior learning. There are 35 different exams (computer-based format) available in five different areas: Composition and Literature, Foreign Languages, Science and Mathematics, History and Social Sciences, and Business. The exams are administered by the Office of Institutional Research and Testing. Proficiency tests for some specific classes are also available. Students may request information on such proficiency tests and pay a fee to take them.

The second avenue is an academic unit-provided proficiency test available for some specific classes. Students may request information on such proficiency tests and pay a fee to take them.. This is done at the department/program level. See the Course Competency Assessment and Testing Policy, Academic Affairs Policy Letter of February 27, 2006.
DVDFilesMECH\Academic Policies\course-competency-testing.pdf

Students can also gain credit for Advanced Placement (AP) courses. A score of 3 or higher is required for credit. The program area assigns the credit. For information about the Advanced Placement Program, see http://www.ferris.edu/admissions/testing/App.htm. Following is an image showing some of the courses with AP course credits and the minimum test score to obtain credit for a course. See Table. 2-1 below.

Table 2-1. CLEP Credit Summary

Course Equivalents and Credits

Ferris State University grants college credit for AP scores of 3, 4, or 5.

Examination	Score	Credits	Course/s
Art, Studio Drawing	3,4,5	3	ARTS 101
Art, General	3,4,5	6	ARTS 101/102
Art, History	3,4,5	6	ARTH 110/111
Biology, General	3	4	BIOL 103
	4,5	8	BIOL 121/122
Chemistry, General	3	5	CHEM 121
	4,5	10	CHEM 121/122
Computer Science A	3,4,5	3	ISYS 110
English Language & Composition	3,4,5	3	ENGL 150
English Literature & Composition	3,4,5	3	LITR 150
Economics, Macro	3,4,5	3	ECON 221
Economics, Micro	3,4,5	3	ECON 222
Environmental Science	3,4,5	4	BIOL 111
French	3	8	FREN 101-2
	4,5	16	FREN 101-2, 201-2
German, Level 3	3,4,5	16	GERM 101-2, 201-2
Gov't and Politics – Comparative	3,4,5	4	PLSC Elective
Gov't and Politics – US	3,4,5	4	PLSC Foundation
History – European	3	3	HIST 151
	4,5	6	HIST 151/152
History – US	3	3	HIST 121
	4,5	6	HIST 121/122
History – World	3,4,5	3	HIST 200
Mathematics Calculus AB	3,4,5	5	MATH 220
Mathematics Calculus BC	4,5	10	MATH 220/230
Calc AB Subgrade	4,5	5	MATH 220
Physics B	3	4	PHYS General Credit
	4,5	8	PHYS 211/212
Physics C (Mechanics or E&M)	3,4,5	4	PHYS General Credit
Psychology	3,4,5	3	PSYC 150
Spanish, Level 3*	3	8	SPAN 101-2
	4	16	SPAN 101-2, 201-2
	5	24	SPAN 101-2, 201-2, 301-2
Statistics	3,4,5	3	STQM 260

F. Graduation Requirements

Summarize the graduation requirements for the program and the process for ensuring and documenting that each graduate completes all graduation requirements for the program. State the name of the degree awarded (Master of Science in Safety Sciences, Bachelor of Technology, Bachelor of Science in Computer Science, Bachelor of Science in Electrical Engineering, etc.)

The degrees conferred upon graduates of the programs are Associate in Applied Science in Mechanical Engineering Technology and Bachelor of Science in Mechanical Engineering Technology. All requirements listed in the catalog and on the checksheet provided to the student when they enroll must be met. This includes a minimum overall GPA of 2.0.

The students must meet with their advisor and complete a graduation audit the semester before graduation. The advisor will make sure all the criteria will have been met before the expected date of graduation. Advisors then attach the program check sheet to the graduation audit and the paperwork is submitted to the Dean's Office where the graduation audit officer verifies that all criteria will be met by the proposed graduation date. A copy of the audit findings are then sent to both the student and the advisor. MyDegree from DegreeWorks™ software is used to assist.

Table 2-2. Program Graduates

	2009/10	2010/11	2011/12	2012/13	2013/14
Mechanical Engineering Technology (AAS)	15	27	26	31	34
Mechanical Engineering Technology (BS)	12	15	22	19	21

Complete 2014/15 data is yet not available.

G. Transcripts of Recent Graduates

The program will provide transcripts from some of the most recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted. ***These transcripts will be requested separately by the team chair.*** *State how the program and any program options are designated on the transcript. (See 2015-2016 APPM, Section II.G.4.a.).*

Transcripts for those receiving the AAS MET degree have a statement near the top that reads:

DEGREES AWARDED
Awarded: Associate in Applied Science Degree Date: May 10, 2014

Curriculum Information
Primary Degree

Program:	Mechanical Engineering Tech
College:	Coll of Engineering Technology
Major:	Mechanical Engineering Tech

Similarly, transcripts for those receiving the BS MET degree have a statement that reads:

DEGREES AWARDED
Awarded: Bachelor of Science Degree Date: May 09, 2015
Curriculum Information
Primary Degree

Program:	Mechanical Engineering Tech
College:	Coll of Engineering Technology
Major:	Mechanical Engineering Tech

3. CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Provide the institutional mission statement.

University Mission Statement (as found at http://www.ferris.edu/htmls/ferrisfaq/mission.htm *):*

> **Ferris State University prepares students for successful careers, responsible citizenship, and lifelong learning. Through its many partnerships and its career-oriented, broad-based education, Ferris serves our rapidly changing global economy and society.**

College of Engineering Technology Mission Statement

> **To prepare graduates who have met the high academic standards of our programs for current and future industrial and business needs of the state, the nation and the global market.**

Mechanical Engineering Technology Programs (as found at http://www.ferris.edu/mece):

> **"The Mechanical Engineering Technology program seeks to provide a stimulating learning environment to prepare students for the broad array of technical careers associated with the discipline."**

B. Program Educational Objectives

List the program educational objectives and state where these can be found by the general public.

Terminology usage in this report:

> Program Educational Objectives are referred to as "Early Career Objectives".

AAS MET Early Career Objectives

In the first five years after completion of the AAS MET degree, graduates will be able to:

1. successfully complete a bachelor of science degree in ~~a technical or other discipline~~
   a. Mechanical Engineering Technology
   b. another discipline
2. find employment appropriate to the discipline.

BS MET Early Career Objectives

In the first five years after completion of the BS MET degree, graduates will be able to:

1. find employment appropriate to the discipline
2. further their education either by pursuing advanced degrees or with continuing education
3. be able to advance to supervisory or other higher positions.

The program educational objectives can be found in the following website:

http://www.ferris.edu/HTMLS/colleges/technolo/ceems/mece/Program-Objectives.htm

C. Consistency of the Program Educational Objectives with the Mission of the Institution

The University's mission is to prepare students for "successful careers, responsible citizenship, and lifelong learning. Through its many partnerships and its career-oriented, broad-based education, Ferris serves our rapidly changing global economy and society."

This is consistent with the mission of the MET program and the Early Career Objectives stated above. Through the coursework, students are taught the fundamentals of engineering technology which prepares them for the employment. The faculty, due to vast industrial experience, brings to the classroom examples similar to what students will encounter. General education courses can help them prepare for the social, economic, and global experiences they will face. These experiences all re-enforce concepts of ethics, diversity and life-long learning.

D. Program Constituencies

The program's Continuous Improvement Plan summarizes its constituency as:

Students

Industry in Michigan.

The program serves its students by giving them the foundation for a solid start in their careers. Industry in the state is served by providing competent technical employees that are vital for the economic lifeblood of the state. Both bring resources to the programs; students through tuition, fees, and energy; industry through direct support, taxes the reach the university, and internships as well as input from professional societies, field trips, and the Industrial Advisory Board.

E. Process for Review of the Program Educational Objectives

Initial educational objectives for the MET programs were established following the 2003 TAC of ABET visit. The ABET "Workshop on Program Improvement" and the ASEE Conference in Salt Lake City were subsequently attended by a faculty member in June 2004. Knowledge gained from these conferences assisted faculty with creating an initial Continuous Improvement Plan. The initial Continuous Improvement Plan was presented and discussed at the April 2005 MET Industrial Advisory Board meeting. The Continuous Improvement Plan, along with initial assessments, were submitted to TAC of ABET in the July 1, 2005, Interim Report.

The program educational objectives are reviewed periodically by faculty and advisory board. In 2010 the objectives for the AAS MET program were altered to separate the objective of "continue their education" into two parts, "continue to BS MET" and "continue to other degrees." Wording for constituency was changed from "Students and State of Michigan" to "Students and Industry in Michigan" to clarify and better represent the support of the Advisory Board.

4. CRITERION 3. STUDENT OUTCOMES

A. Process for the Establishment and Revision of the Student Outcomes

Faculty initially established program outcomes for the AAS MET and BS MET programs in the same manner as Educational Objectives were established. A faculty member took ABET sponsored training and attended many sessions on continuous improvement and assessment at the 2004 ASEE Conference in Salt Lake City. Upon return, course outcomes were developed into the MET continuous improvement plan.

Faculty and the Industrial Advisory Board have reviewed the outcomes periodically. Current outcomes for both the AAS MET and BS MET programs are presented below.

B. Student Outcomes

List the student outcomes for the program and describe their mapping to those in Criterion 3 and any applicable program criteria. Indicate where the student outcomes are documented.

AAS MET STUDENT OUTCOMES

At the time of graduation, AAS MET students will be able to:

1. apply engineering principles to technical challenges and opportunities
2. carry out an experimental study of a component including data collection, analysis, oral presentation, and written report
3. demonstrate communication skills - oral, written, and visual
4. demonstrate ability to work on teams
5. demonstrate understanding of ethical issues in their discipline
6. broaden their background with study in humanities and social sciences
7. understand options to continue their education.

ETAC of ABET Student Outcomes for AAS programs:

A. For associate degree programs, these student outcomes must include, but are not limited to, the following learned capabilities:

a. an ability to apply the knowledge, techniques, skills, and modern tools of the discipline to narrowly defined engineering technology activities;
b. an ability to apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require limited application of principles but extensive practical knowledge;
c. an ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments;
d. an ability to function effectively as a member of a technical team;
e. an ability to identify, analyze, and solve narrowly defined engineering technology problems;
f. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;
g. an understanding of the need for and an ability to engage in self-directed continuing professional development;
h. an understanding of and a commitment to address professional and ethical responsibilities, including a respect for diversity; and
i. a commitment to quality, timeliness, and continuous improvement.

The mapping of AAS MET Student Outcomes to ABET Outcomes appears below.

Table 4-1. Mapping of AAS MET Student Outcomes to ETAC of ABET Student Outcomes a-i for associate degree programs.

ETAC of ABET Criteria 3 Student Outcomes	a. knowledge, techniques, skills, and modern tools	b. mathematics, science, engineering, and technology	c. standard tests and measurements…… experiments	d. team	e. identify, analyze, and solve	f. communication….. appropriate technical literature	g. continuing professional development;	h. professional and ethical responsibilities ….diversity	i. quality, timeliness, and continuous improvement
AAS MET Program Outcomes									
1. apply engineering principles	X	X	X		X				
2. experimental study of a component and basic system	X	X	X	X	X	X			X
3. communication skills						X			
4. teamwork				X					X
5. ethics								X	
6. humanities and social science								X	
7. continue education							X		

ASME Criteria for AAS Mechanical Engineering Technology Programs

The AAS MET program's Outcomes 1, 2, and 3 support the ASME requirement that: "Associate degree programs must demonstrate that graduates can apply specific program principles to the specification, installation, fabrication, test, operation, maintenance, sales, or documentation of basic mechanical systems depending on program orientation and the needs of their constituents."

Coursework in fluid mechanics, statics and strengths of materials, machine design, engineering graphics, manufacturing, and communications support this outcome.

BS MET STUDENT OUTCOMES

At the time of graduation, BS MET students will be able to:

1. apply engineering principles to complex technical challenges and opportunities
2. carry out a capstone engineering project involving design, testing, analysis, presentation, and reporting
3. demonstrate communication skills, oral, written, and visual, including a formal oral presentation
4. demonstrate ability to work on teams
5. demonstrate proficiency in the modern tools of the discipline
6. demonstrate understanding of ethical issues in their discipline
7. relate issues in diversity and globalization to their discipline
8. understand options to continue their education
9. relate their education to problems in industry.

ETAC of ABET Student Outcomes for BS programs:

B. For baccalaureate degree programs, these student outcomes must include, but are not limited to, the following learned capabilities:
   a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
   b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
   c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
   d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
   e. an ability to function effectively as a member or leader on a technical team;

f. an ability to identify, analyze, and solve broadly-defined engineering technology problems;
g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;
h. an understanding of the need for and an ability to engage in self-directed continuing professional development;
i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
j. a knowledge of the impact of engineering technology solutions in a societal and global context; and
k. a commitment to quality, timeliness, and continuous improvement.

The mapping of BS MET Student Outcomes to ABET Outcomes appears below.

Table 2-2 Mapping of BMET Student Outcomes to ETAC of ABET Student Outcomes a-i for bachelor degree programs.

ETAC of ABET **Criteria 3** **Student Outcomes**	a. knowledge, techniques, skills, and modern tools	b. mathematics, science, engineering, and technology	**c.** std tests and measurements.. experiments..improve processes	**d.** design systems, components, or processes	**e.** team	**f.** identify, analyze, and solve broadly defined ….	**g** communication….. appropriate technical literature	**h.** continuing professional development;	**i.** professional and ethical responsibilities ….diversity	**j.** impact ……. societal …….global	**k.** quality, timeliness, and continuous improvement
BS MET **Program Outcomes**											
1. complex technical challenges and opportunities	X	X		X		X					
2. capstone project	X	X	X	X		X	X		X		X
3. communications							X				
4. teamwork					X				X		
5. modern tools of discipline	X	X		X		X					
6. ethics									X	X	
7. diversity and globalization									X	X	
8. continue education								X			
9. industry experiences					X		X				X

Student Outcomes for both programs are published at:

http://www.ferris.edu/HTMLS/colleges/technolo/ceems/mece/program-outcomes.htm

C. *Relationship of Student Outcomes to Program Educational Objectives*

Describe how the student outcomes prepare graduates to attain the program educational objectives.

A mapping between Student Outcomes and Early Career Objectives for each MET program is shown below. In summary, the Objectives are very broad and thus supported by most if not all student Outcomes.

Table 4-3. AAS MET Student Outcomes Mapped to AAS MET Early Career Objectives

	AAS MET Student Outcomes						
AAS MET Early Career Objectives (PEOs)	1. apply engineering principles to technical challenges and opportunities	2. carry out an experimental study of a component including data collection, analysis, oral presentation, and written report	3. demonstrate communication skills - oral, written, and visual	4. demonstate ability to work on teams	5. demonstrate understanding of ethical issues in their discipline	6. broaden their background with study in humanities and social sciences	7. understand options to continue their education.
1. successfully complete a bachelor of science degree in :							
a. Mechanical Engineering Technology	X	X	X	X	X	X	X
b. another discipline	X	X	X	X	X	X	X
2. find employment appropriate to the discipline	X	X	X	X	X	X	X

Table 4-4. BS MET Student Outcomes Mapped to BS MET Early Career Objectives

	BS MET Student Outcomes								
BS MET Early Career Objectives (PEOs)	1. apply engineering principles to complex technical challenges and opportunities	2. carry out a capstone engineering project involving design, testing, analysis, presentation, and reporting	3. demonstrate communication skills, oral, written, and visual, including a formal oral presentation	4. demonstrate ability to work on teams	5. demonstrate proficiency in the modern tools of the discipline	6. demonstrate understanding of ethical issues in their discipline	7. relate issues in diversity and globalization to their discipline	8. understand options to continue their education	9. relate their education to problems in industry.
1. find employment appropriate to the discipline	X	X	X	X	X	X	X		X
2. further their education either by pursuing advanced degrees or with continuing education	X	X	X	X	X	X	X	X	
3. be able to advance to supervisory or other higher positions.	X	X	X	X	X	X	X	X	X

5. CRITERION 4. CONTINUOUS IMPROVEMENT

A. Student Outcomes

The Continuous Improvement Plan for the MET programs began in summer 2004 with a faculty member taking ABET training then focusing on accreditation and assessment sessions at the ASEE Annual Conference in Salt Lake City. In the following weeks, faculty developed program objectives and student outcomes. Course outcomes tied to TAC/ABET and program outcomes were established as well. This information was submitted to TAC/ABET as part of the program's response to findings from a Fall 2003 visit. Data collection began in Fall 2004. The objectives, outcomes, and assessment plan were reviewed with the MET Advisory Board in April 2005 with initial results submitted as part of an Interim Report in July 2005.

The MET continuous improvement process and results were also reported in the 2011 Interim Report.

Current Status
The current version of the Continuous Improvement Plan (CIP) plan is in a separate file. Updates include converting to ABET's current homogenized outcomes and redefining assessment methods.

DVDFilesMECH\CIP-Assessment\MET_CIP_14Sept1615Jun92015Jun22a.pdf

Review of Continuous Improvement for Program Outcomes

A review including outcome-by-outcome analysis follows. The AAS MET program is evaluated first. It is perhaps noteworthy that the BS MET program is the primary result for the MET program at this institution. Consequently most emphasis on assessment is placed on the BS program.

Student Outcomes are repeated.

AAS MET Student Outcomes

At the time of graduation, AAS MET students will be able to:

1. apply engineering principles to technical challenges and opportunities
2. carry out an experimental study of a component including data collection, analysis, oral presentation, and written report
3. demonstrate communication skills - oral, written, and visual
4. demonstrate ability to work on teams
5. demonstrate understanding of ethical issues in their discipline
6. broaden their background with study in humanities and social sciences

7. understand options to continue their education.

Assessment for AAS MET Student Outcomes

The original Continuous Improvement Plan, 2005, called for a lot of assessment to come from the AAS capstone, MECH 221 Mechanical Measurements. This was done. However, with a curriculum change, this course was moved to the junior year (MECH 332). Other course work has been substituted.

Outcome 1. Apply engineering principles to technical challenges and opportunities

A project in MECH 212 Kinematics of Mechanisms and final project in MECH 222 Machine Design and MECH 223 Thermodynamics are used for assessment of this outcome.

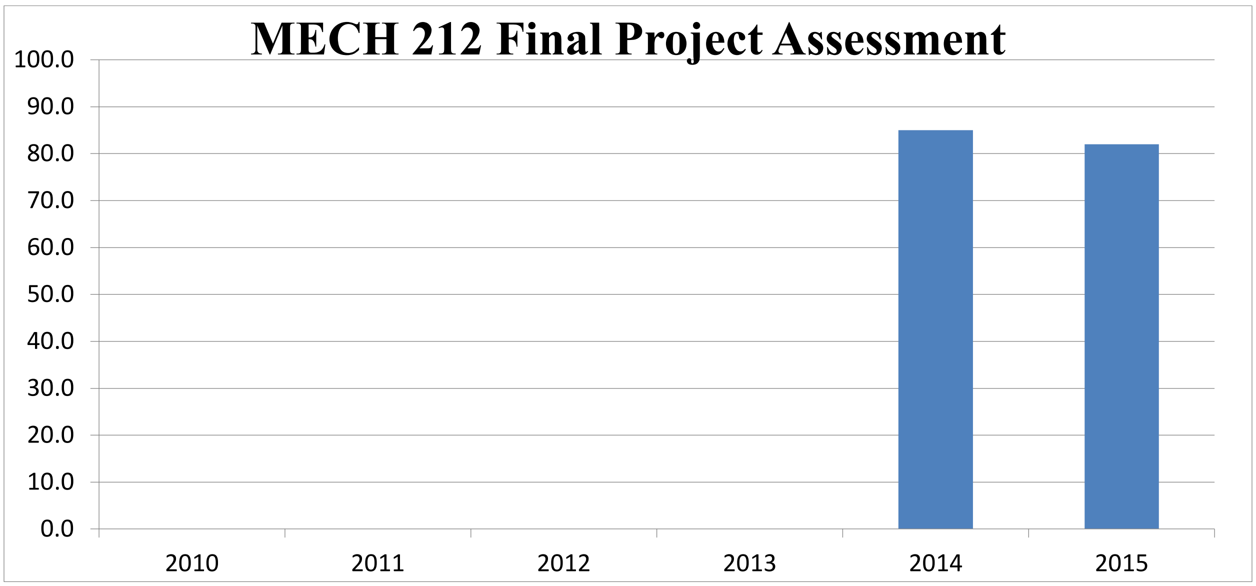

Figure 5-1. MECH 212 Kinematics Final Project

Data began in Spring 2014 with an instructor change. 80% appears to be a suitable target.

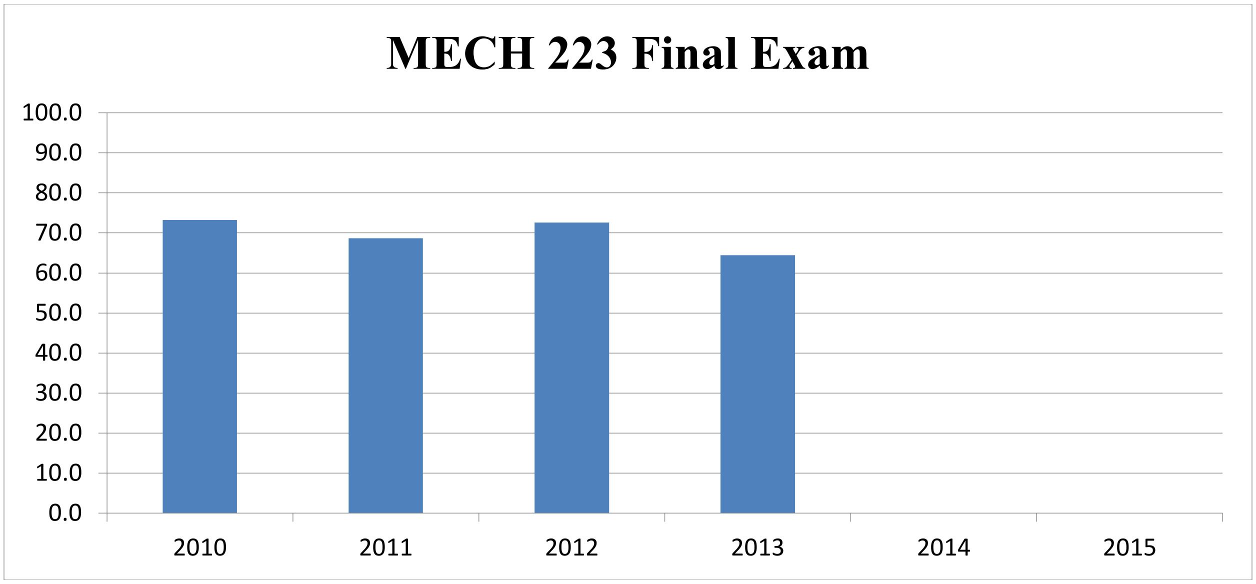

Figure 5-2. MECH 223 Thermodynamics Final Exam scores.

Figure 4-2 shows final exam averages for Thermodynamics. An interesting observation in Spring 2013 was that there was an unexpected difference in the average scores for the two sections of Thermodynamics. The sections performances in each section matched well up to the final exam. The section that took the same final later in the week had much lower scores, 69.2 vs 58.8% for the class that took the exam later. Did the exam schedule make that much difference? Target for this assessment is 70%. The instructor was changed in Spring 2014 with the new instructor electing not to give a comprehensive final exam.

There will be a new instructor in Spring 2016. Assessment needs to be re-established.

Outcome 2. Carry out an experimental study of a component including data collection, analysis, oral presentation, and written report

Two lab sessions are used, one from MECH 211 Fluid Mechanics and the other from MECH 341 Lab for Statics and Strengths of Materials.

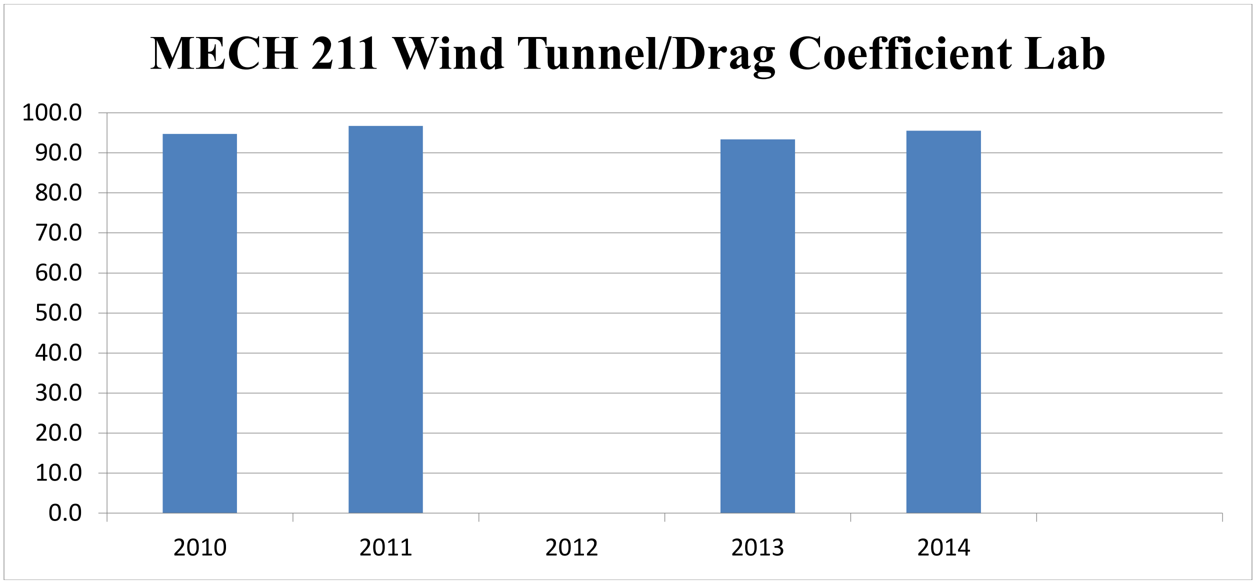

Figure 5-3. Mean scores from Drag Coefficient lab

This popular and long standing experiment begins with students constructing a 'vehicle' shape that will be tested in the program's wind tunnel. The goal is to create a shape with the least drag coefficient given geometric restraints. From measured drag force and Pitot tube pressure differential, teams determine the drag coefficient for their shape. The computations prove challenging, but, with attention to detail, students do quite well. Scores of 0, which indicate either non-participation or no report submitted, have been removed from the data. An average score of at least 90 is expected. Results are satisfactory as students clearly demonstrate that they can carry out a fairly complex experiment and document results.

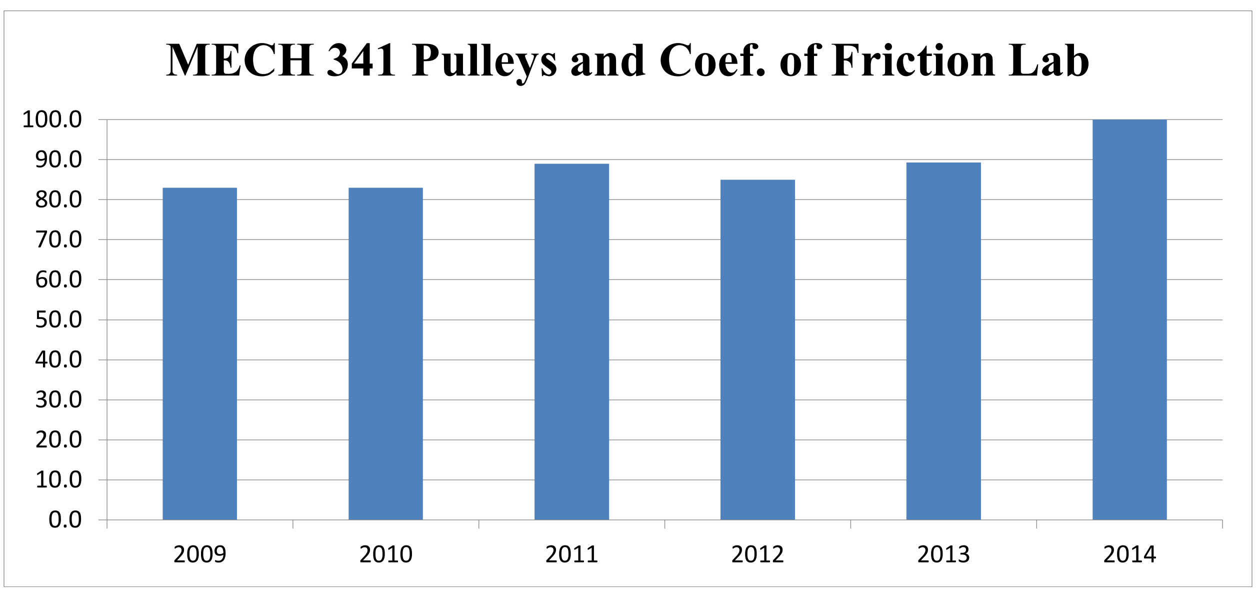

Figure 5-4. MECH 341 Pulleys and Coefficient of Friction Lab assessment

In this lab, students do some classical "frictionless" pulley and inclined plane experiments for practice with statics. The 2014 lab was not assessed with the average shown only representing attendance and submittal of a report. Target score is 85. Monitoring will continue.

Outcome 3. Demonstrate communication skills – oral, written, and visual

Students in MECH 222 Machine Design submit team design projects at the end of the semester. The instructor assesses both oral communication and written communication skills. In addition to their oral reports, teams are required to come up with at least two engineering questions for another team. The results of the last three years for oral presentations for the last project were: 88.9, 88.6, and 85.7%. Target is 85%. Report average scores for 2013 and 2015 were 90.7 and 84.0 respectively. The program needs to establish separate assessment for written communication.

Outcome 4. Demonstrate ability to work on teams

Teamwork is assessed with team project overall scores from MECH 222 Machine Design and from student self-assessment for their team design project in MECH 341 Lab for Statics and Strengths of Materials.

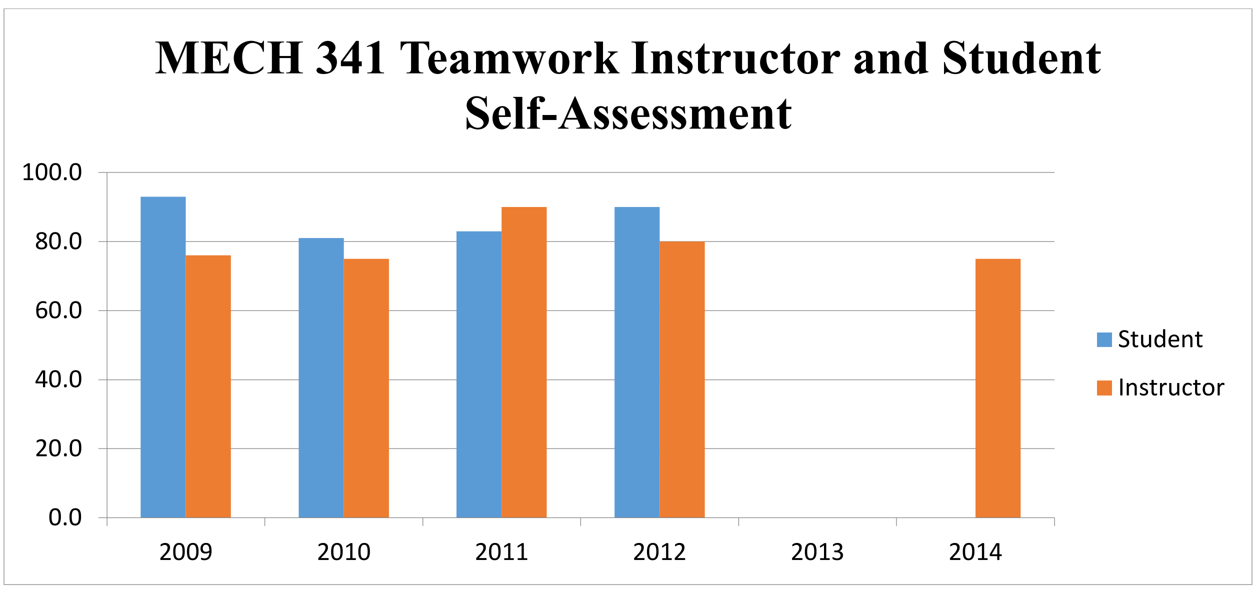

Figure 5-5. Teamwork Assessment MECH 341 Lab for Statics and Strengths of Materials

Student teams design a structure to meet specific design constraints. The structure is primarily a classical truss with one or more beam elements supporting a moveable load. A self-evaluation is completed at the end of the semester. The instructor score is the mean project grade. Target is 80%.

Outcome 5. Demonstrate understanding of ethical issues in their discipline

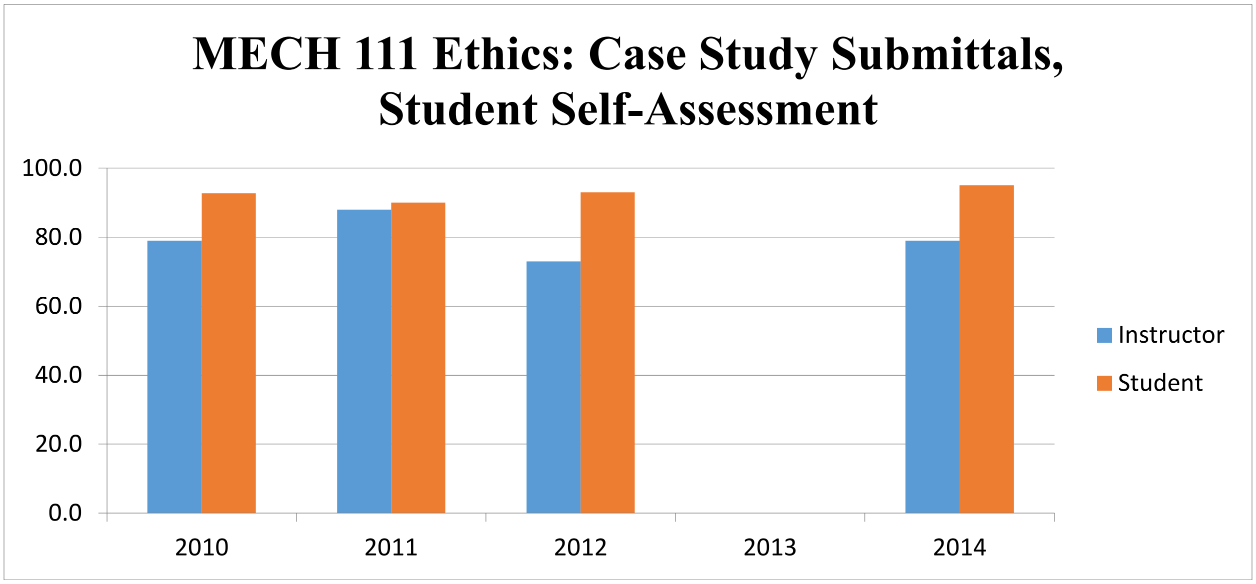

Figure 5-6. Ethics assessment in MECH 111 MET Seminar.

In MECH 111 MET Seminar students, working in groups, create a code of ethics for MET students. From the group codes, a consensus class code of ethics evolves which students ratify with their signatures. Students then review the ASME Code of Ethics and are given a case study to do individually outside of class. Assessments reported here include instructor's assessment, and student self-assessment. Targets are 80%. Monitoring will continue.

Outcome 6. Broaden their background with study in humanities and social sciences

This outcome is built into the institution's general education requirements. Students are required to take coursework in each of these areas. Classes must meet institution established outcomes. No programmatic assessment is done for this outcome. Departments offering general education courses are expected to provide data on the achievement of specified learning outcomes.

Outcome 7. Understand options to continue their education.

Registration data is used to evaluate this outcome. A key AAS MET completion course is MECH 222 Machine Design. Class lists were reviewed from Spring 2010 to Spring 2014. Transcripts were used to determine if students continued into the BS MET program or continued into another BS program at this institution. Students whose primary major was not MET were not counted in the data and neither were students who did not finish the AAS program. The most common alternative to BS MET has been Product Design Engineering Technology. Several have gone into Graphic Arts and into Automotive Engineering Technology after completing their AAS MET.

Table 5-1. Summary of academic activity after AAS MET.

Term Enrolled in MECH 222	No. Finishing AAS MET	No. Continue to BSMET	No. Continue to other BS	% to BSMET	% to other BS	**% to BS**	% leaving
2010	30	25	5	83.3	16.7	**100.0**	0.0
2011	21	15	4	71.4	19.0	**90.5**	9.5
2012	25	23	1	92.0	4.0	**96.0**	4.0
2013	41	35	3	85.4	7.3	**92.7**	7.3
2014	37	35	2	94.6	5.4	**100.0**	0.0

The original Continuous Improvement Plan calls for exit surveys as students complete their AAS MET program. Collecting these surveys has been problematic. Target is 90% of students continuing to a BS program. It is clear that students understand their options to continue their education.

BS MET Program Outcomes

At the time of graduation, BS MET students will be able to:

1. apply engineering principles to complex technical challenges and opportunities
2. carry out a capstone engineering project involving design, testing, analysis, presentation, and reporting
3. demonstrate communication skills, oral, written, and visual, including a formal oral presentation
4. demonstrate ability to work on teams
5. demonstrate proficiency in the modern tools of the discipline
6. demonstrate understanding of ethical issues in their discipline
7. relate issues in diversity and globalization to their discipline
8. understand options to continue their education
9. relate their education to problems in industry.

Assessment of program outcomes for the BS MET program comes largely from the capstone course MECH 499 MET Senior Project. In this course, each student has a project of their choice in which they are to "capstone their major." Key outcomes that are assessed include Outcomes 1, 2, 3, 5 within their projects as well as Outcomes 6, 7, and 8 which involve several class periods in MECH 499 and are assessed separately from the capstone project. Assessment for most of these outcomes has taken place for eleven years.

Assessment for the MECH 499 projects (Outcomes 1, 2, 3, 5) has been compiled in a large spreadsheet DVDFilesMECH\CIP-Assessment\AssessPDET_MECH499_05_15 2015Jun12.pdf. Input for many of the outcomes involves the use of scaled impressions by the instructor, faculty, advisory board, and/or students themselves. Some of the rubrics that are used appear in Section C of Criterion 4. Note that not all information from the rubrics is tracked; only the information that most directly relates to outcomes is compiled.

In addition to quantitative measures, the post interview impressions from advisory board members and focus group discussion are also documented. These impressions appear in the minutes for each advisory board meeting. Notes from Board members observations are also reviewed and shared with students.

Changes made to the MET capstone course have included dropping PDET 499 Product Design Senior Project and replacing it with first a two-credit MET (2006) specific capstone then finally with the current three-credit course MECH 499 (2007). The latter course is directed specifically at BS MET outcomes. Results are discussed under applicable outcomes below.

In general, assessments are reported as average 'scores' rather than as percent of students reaching a specified score.

<u>Outcome 1.</u> Apply engineering principles to complex technical challenges and opportunities.

During program outcomes review at the April 23, 2010, Advisory Board meeting, a Board member suggested replacing the term "problem" with more positive terminology "challenges and opportunities." Faculty discussed the suggestion during the following academic year and supported it at their January 14, 2011 program meeting. The change was made permanent at the April 2011 Advisory Board meeting.

Assessment has generally been triangulated with ratings from the instructor, other faculty, students, and/or advisory board considered. Project complexity is rated for each project by means of a rubric. Year-to-year data initially suggested benefit from creating a MET-specific capstone although these ratings have leveled off. The results of year-to-year assessments on the complexity of senior projects appear below. Further discussion occurs under Outcome #2.

Seniors in MECH 499 Senior Project do individual design-build-test-report projects. All projects are different in their scope, complexity, and opportunity to capstone a major. Advisory board members spend 5-15 minutes reviewing projects at poster sessions, faculty often have listened to 15-20 minute slide presentations on some projects, and may have been more involved on others. Consequently assessments are quite subjective. Regardless, results are tracked.

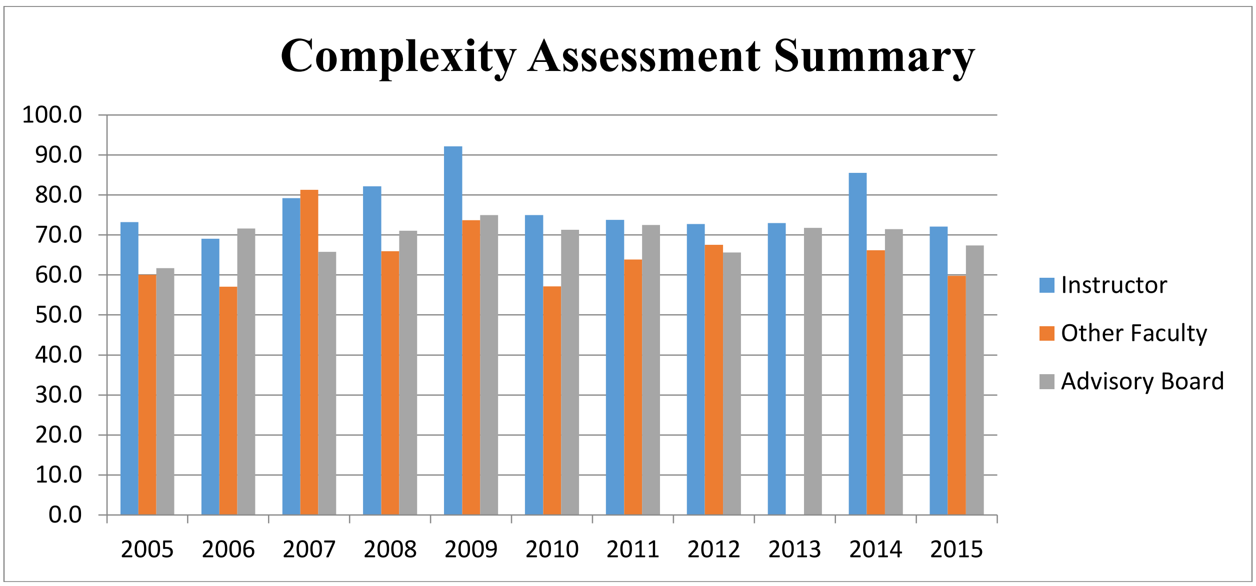

Figure 5-7. Summary of comparative Complexity assessment from projects

Target score of 70 is desirable. Year-to-year differences are difficult to explain as there is a fairly large amount of subjectiveness in the ratings. For instance, 2015 saw a large jump in class size and thus less access to the instructor and to workspaces; these factors may have affected results. Instructor's marks may be higher than those of other faculty due to the instructor being more familiar with each project. To improve ratings students are strongly encouraged to bring out their design calculations and analysis in their oral and poster presentations.

More direct measures of students' ability to handle complexity comes from tracking results from portions of tests that involve Fast Fourier Transforms (FFT) and compressible flow through variable area flowmeters. These topics are introduced in MECH 421 Senior Lab. While not going deep into theory, there are multiple challenging abstract concepts to grasp to use FFT correctly. Compressible flow analysis likewise is challenging as it suddenly brings in concepts from MECH 223 Thermodynamics and MECH 211 Fluid Mechanics – subjects from several years before. Few do the analysis perfectly. For the years 2012-14, average scores for FFT problems were 75.1, 71.0, and 72.0 % while scores for the compressible flow meter problem were 78.8, 78.9, and 83.8%. Target for both is 80%. Some concepts from FFT are included on a later test for reinforcement but not compiled. The instructor is attempting to develop better lab experiences to aid in understanding FFT.

Additionally, the CIP called for exploration of the use of an abbreviated Fundamentals of Engineering exam as a means of assessment for this outcome. A fee-based, one-hour, 30-question, on-line version was given for 5 years. Students were not encouraged to take the time to review for this test as they have too many other priorities. The instructor simply discusses the nature of the test, reviews some sample questions, and briefly discusses test strategy. The test is taken only to give students the experience and make them aware of the exam. The test is deemed too short and not suitable for overall program outcome assessment. In addition the supplier did not provide a consistent test from one year to another. The fee-based practice exam has been replaced with a shorter sample practice FE exam again to give students some experience with these exams should they ever want to become registered. The sample FE exam is not part of the CIP.

Outcome 2. Carry out a capstone engineering project involving design, testing, analysis, presentation, and reporting.

Several measures of assessment are used. The first involves a comparison of the instructor's and students' impression on whether their major has been "capstoned." Results above 80% have been typical. A dip in instructor ratings occurred for 2011 and 2012. Interestingly, that dip does coincide with drops in homework submittals in MECH 330 Heat Transfer for Fall 2009 and 2010, the years that most of these seniors would have been taking Heat Transfer. Lower results also appear in course assessment for MECH 211 in the years most of these would have been taking that class. Perhaps a weak class.

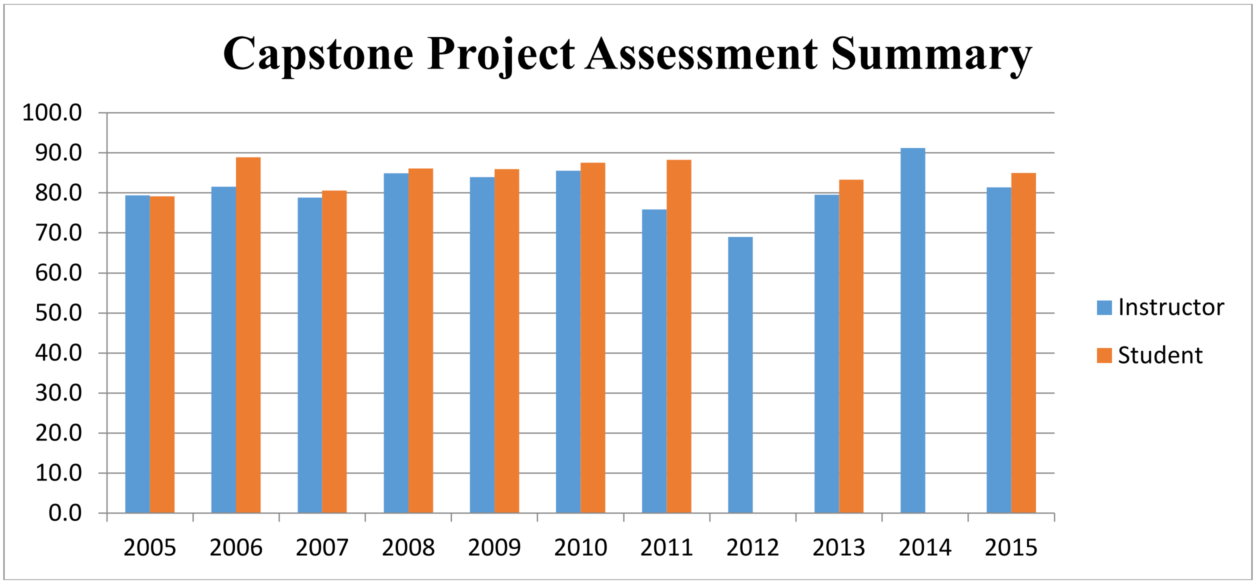

Figure 5-8. Summary of "Capstone Your Major" assessment

A second measure asks evaluators if the use of BS MET coursework is demonstrated by the project using a rubric. There is a fair amount of scatter in these results as well. Instructor and other faculty ratings occur at the 15-20 minute slide presentations that each senior does; Advisory Board ratings occur after 5-15 minute interviews on Project Day. Target score would be 70%.

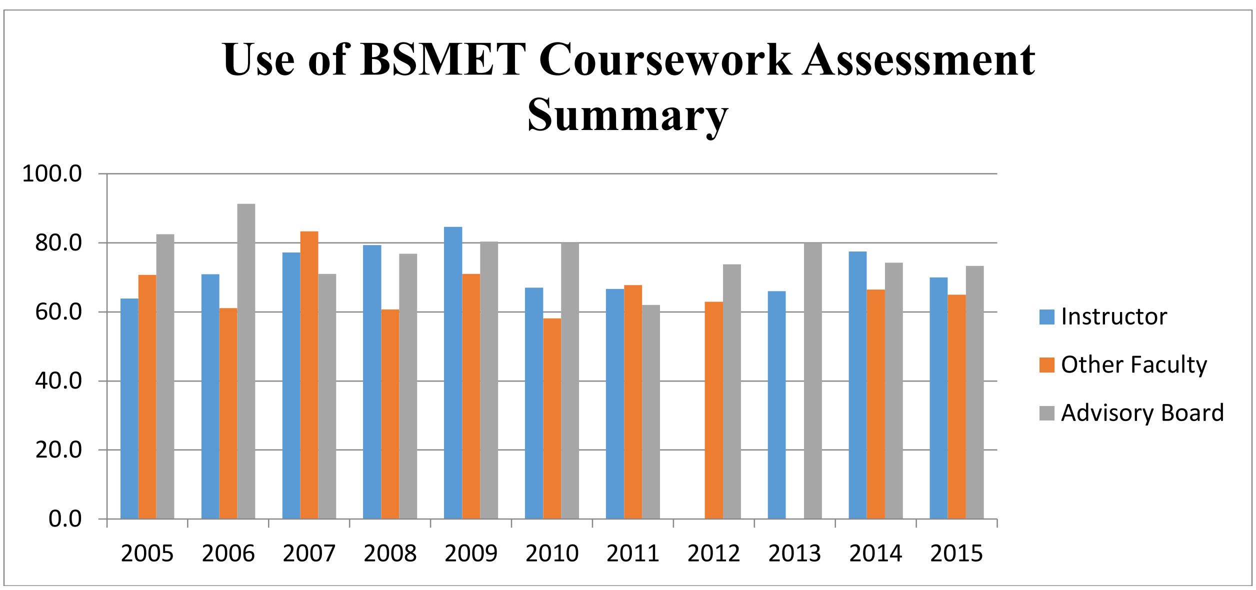

Figure 5-9. Summary of use of BSMET Coursework assessment.

As indicated above, board members and faculty form a focus group at each advisory board meeting following board member review of projects. Board member comments are summarized in board minutes available on site or on request.

In recent years, there have been comments regarding projects not being complete by Project Day. Faculty noted that a majority of the course grade (80%) is determined by the major deliverable in the course, specifically the written report which is due at the end of the semester. Demonstration of technical competency is a key part of the report grade. It was also observed that several seniors, who have been typically near or at the bottom of the class on exams in engineering science courses, demonstrated very good self-motivational project management skills; that is, they got moving early, developed prototypes, had time for changes, made changes following coaching, etc. They were clearly demonstrating adherence to ETAC/ABET's Outcome k, "…quality, timeliness, and continuous improvement." Discussion followed on whether the project grade should reflect ETAC/ABET Outcome k more and reflect less on the written report.

As a result, the instructor changed the course grading scheme to include 10% of the grade in a category called "Professionalism." This category includes getting progress reports, preliminary calculations and other assignments in on time, being punctual for one-on-one appointments, completing on-line lab safety training when assigned, graphics for the Project Day booklet on-time and submitting reports in proper format with good writing. "Professionalism" scores for the first three years, 2013-15, were 69.2%, 97.4%, and 84.4%. Trends will need to be established. While it appears that there is no significant change, it is too early to tell if including Professionalism as part of the overall grade in the course has a positive impact on individual progress.

An additional change was made during 2014-15 in response to the issue of projects not being completed and questions on their quality. In recent years students were required to submit a draft proposal before they were allowed to enroll in the capstone course. All complete proposals were accepted. Beginning in Fall 2014, proposals needed to be accepted by the faculty as a committee. Rejected proposals were sent back with feedback. Ten faculty committee meetings that focused on proposals took place. Feedback included suggestions and comments on the potential of the proposed projects to capstone each student's college experience. Data above does not infer improvement in this regard. It is perhaps noteworthy that there was also a large step in enrollment in MECH 499 for Spring 2015. Thish reduced faculty and facility resources for students.

The concept of starting senior projects earlier was discussed at faculty meetings in 2014-15. A tentative plan called for not adding credits, breaking the class into one credit in Fall semester to do planning and design with the Spring semester starting with build and test. Advisory Board members supported the concept. Faculty have begun to layout and consider a curriculum change.

This very important outcome will continue to be reviewed.

<u>Outcome 3.</u> Demonstrate communication skills, oral, written, and visual, including a formal oral presentation.

Basic writing skills (grammar, punctuation, sentences, etc.) are evaluated by the instructor and compared to student self-evaluation. The results are steady with only an occasional student claiming "I can't write" and only an occasional report sent back to the student due to excessive grammatical errors. Advisory board members have typically felt students expressed themselves and explained their projects well orally.

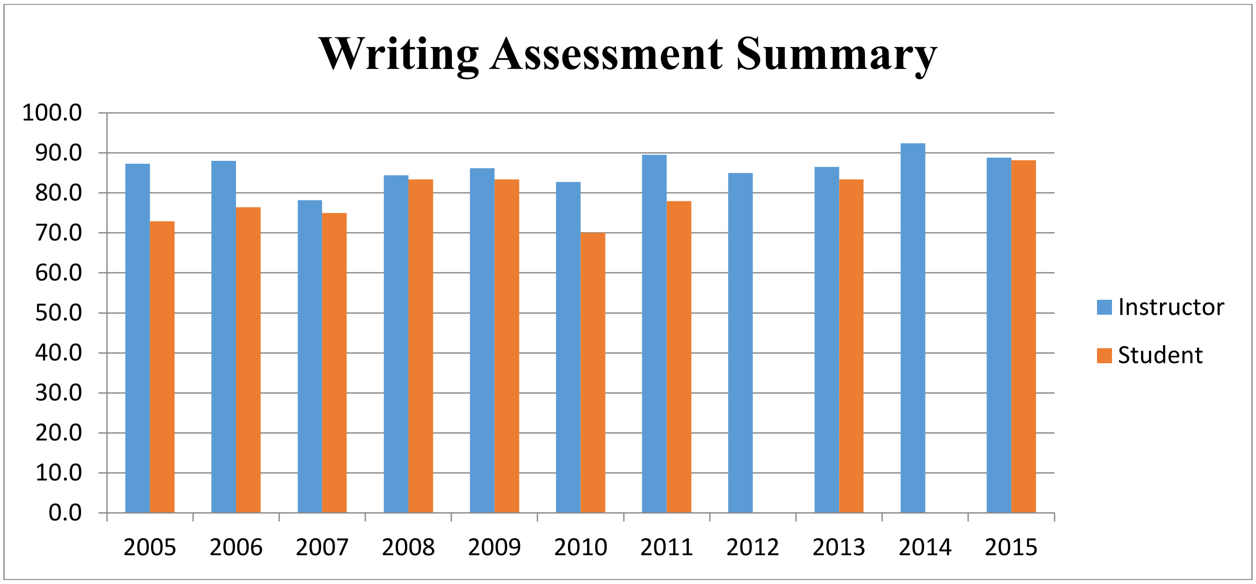

Figure 5-10. Summary of Writing assessment.

Target score would be 85.

This outcome will continue to be reviewed per our Continuous Improvement Plan.

<u>Outcome 4</u>. Demonstrate ability to work in teams

(This outcome is not assessed during MECH 499 MET Senior Project.)

This outcome is assessed by looking at group project scores for MECH 421 Senior lab offered in Fall each year plus student self-evaluation. MECH 421 project grades have been very high – 90s or higher. There are no significant trends in team project scores. There was a 10% drop in student evaluation in Fall 2012; otherwise they are a satisfactory 80% typical each year. That is, students seem to get along and work together. 90% and 80% would be target scores.

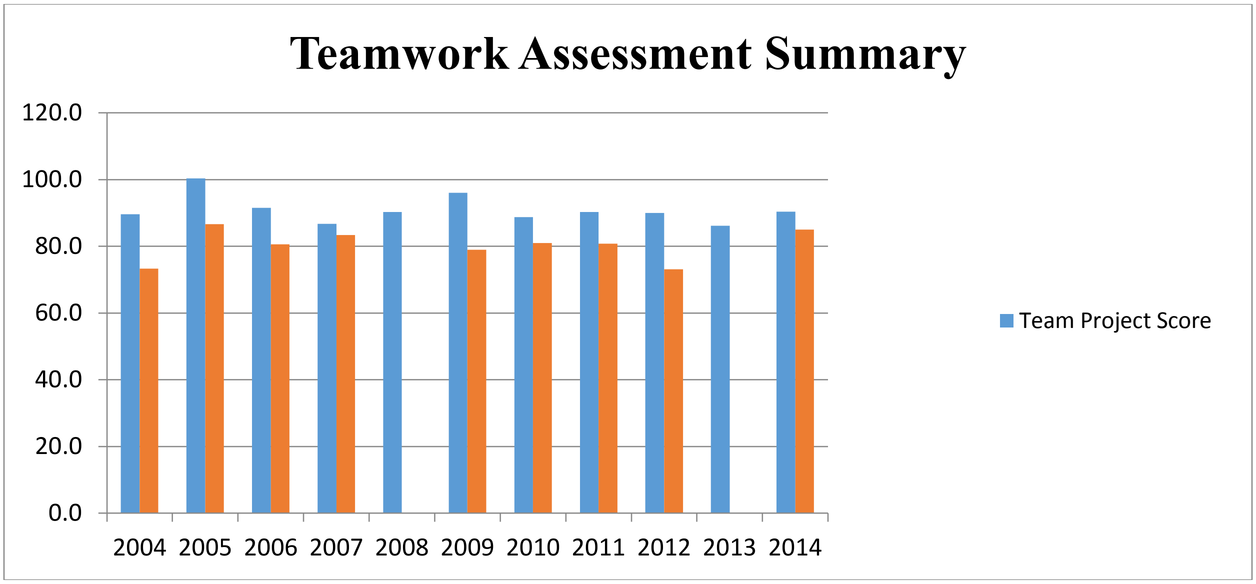

Figure 5-11. Summary of Teamwork assessment.

Advisory board and faculty have discussed the option of having senior projects be team-based rather than individual-based. Currently students may and do work together, but each must have a definable design-build-test-report role that they are responsible for. There have been several interdisciplinary projects. Pros of changing to strictly team-based projects include fewer projects to manage, team assessment in the final semester, and perhaps projects would be more complete and more impressive. Cons include letting "slackers" coast and reduced opportunity for students to self-manage. Faculty support gets spread thin. Recent advisory board opinion has recommended keeping projects individual based. Another Ferris BS program with strictly team projects has reported incomplete projects and motivational issues in spite of using teams, weekly logs, team advisors, and attempts at tight monitoring. This is a common problem.

The consensus is to leave the capstone projects as individually focused.

<u>Outcome 5</u>. Demonstrate proficiency in the modern tools of the discipline.

This outcome is assessed primarily with a simple rubric used by the instructor for MECH 499 Senior Project. 20 points are awarded for each 'modern tool' such as word processing, spreadsheets, CAD, FEA, LabVIEW™, MathCAD™, CNC, etc. that was demonstrated in the senior project. With the addition of Arduinos™ to MECH 322 Computer Apps for Technology 2 in Spring 2014, several students have incorporated Arduinos into their projects. Unnecessary use of modern tools is discouraged – i.e. an FEA model is not needed to analyze a simply supported, square tube straight beam; hand calculations are more appropriate. An upward trend since moving away from PDET 499 Product Design Project is noted.

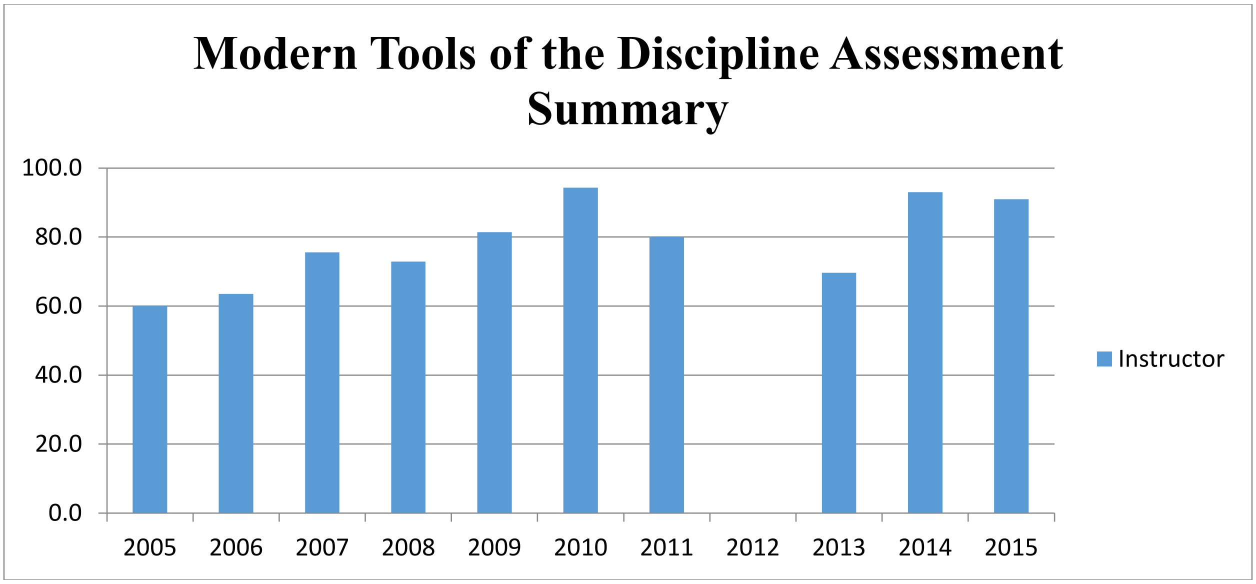

Figure 5-12. Summary of Modern Tools of the Discipline assessment.

A second assessment of "modern tools" is with the use of LabVIEW™ data acquisition and analysis software in MECH 421 Senior Lab. A "basics of LabVIEW™" test has been developed by the instructor to use as an assessment instrument. Student self-assessment is also tracked. The slight dip in the exam scores for Fall 2010 may have been the result of switching from a very thorough text to one that put more emphasis on concepts. The new book also put more emphasis on state machines – a concept that was new to the instructor. Regardless, the results are satisfactory. The drop in student confidence for Fall 2012 is unexplained and does not coincide with their test scores. Target is a 90% class average on the exam which has been achieved after adjustment to the new approach to programming.

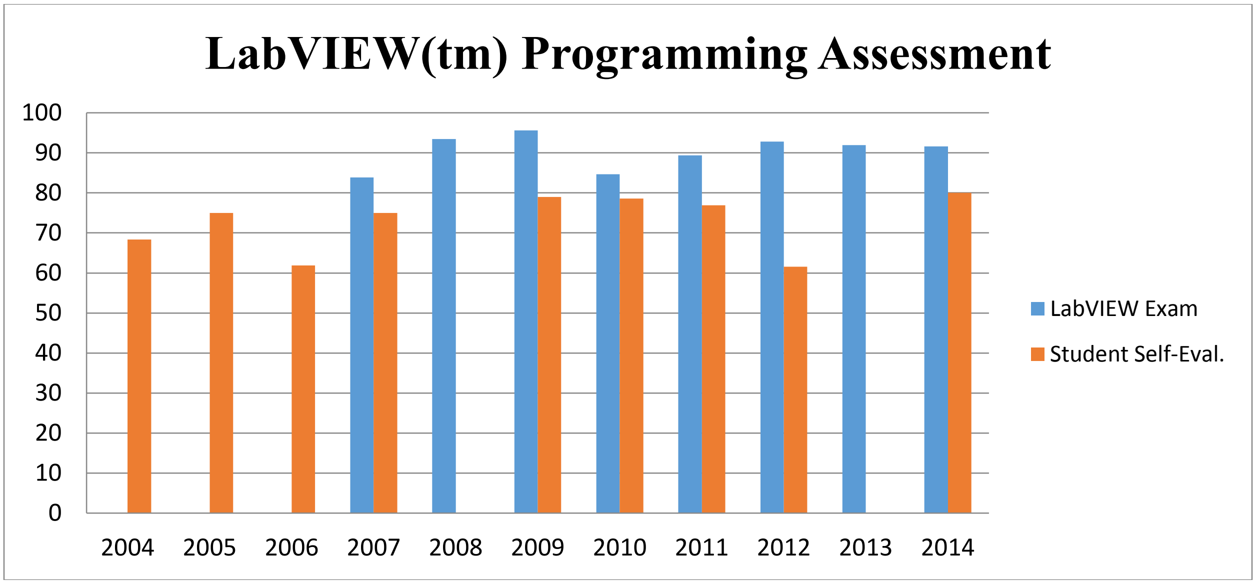

Figure 5-13. Summary of LabVIEW™ programming assessment

Suggestions for curriculum from the summer 2009 alumni survey did include several responses that suggested solid modeling be added to the curriculum. This feedback came mostly from early BS MET grads. A 2007 MET curriculum change proposal addressed this issue by creating a two-credit Solid-Modeling/FEA course for MET students which essentially satisfied this survey result.

<u>Outcome 6</u>. Demonstrate understanding of ethical issues in their discipline

The ASME Code of Ethics is discussed along with several case studies during lecture time in MECH 499 Senior Project. Students are then given a case study to evaluate individually that includes conflicts between canons of ethics – specifically a conflict between the 'protecting the public' and 'faithful servant of an employer' canons. Assessment is based on handwritten student responses. An instructor-developed rubric is used which goes beyond simply recognizing right from wrong, but includes relating options to canons and recognizing conflicts among canons of ethics. Results show reasonable average scores in the 80s. This is considered satisfactory. Target is 85%.

Figure 5-14. Summary of ethics case study assessment.

Feedback from alumni and intern employers does not suggest further work is needed in this area. Nonetheless, instruction in codes of ethics was brought up by faculty at the April 2011 Advisory Board meeting. One advisory board member mentioned that cases such as the one mentioned above have come up in his experience – i.e. supplier inside knowledge being or not being shared with buyers.

Also the university is revising its general education policies. Connecting university general education to program accreditation requirements has been suggested.

This outcome will continue to be reviewed per our Continuous Improvement Plan.

Outcome 7. Relate issues in diversity and globalization to their discipline.

As with ethics, the topics of diversity and globalization are covered in lectures in MECH 499 MET Senior Project. Material from ASME is again used for both topics.

ASME's "Society Policy: Diversity in ASME Membership and Volunteer Personnel, P-15.11" is distributed in a lecture and discussed along with slides from an ASME presentation. In years prior to 2009, a speaker from the university's legal office visited the class and gave a presentation related to hiring practices. This was followed by a pre-employment quiz. However, the focus of the quiz was more on detail of population demographic statistics and didn't relate well to broad issues in diversity.

In Spring 2009, following consultation with the Academic Affairs Office, assessment was changed to using a small portion of a university climate assessment tool (EBI). The assessments measure change in attitudes towards persons of different race/ethnicity, gender, and religious identification. A score of 57% is neutral (i.e., attitudes towards person in other groups has not changed during their college experience). The results are fairly stable and are close to a neutral result. Again, the survey doesn't ask for attitudes; it asks for changes in attitude.

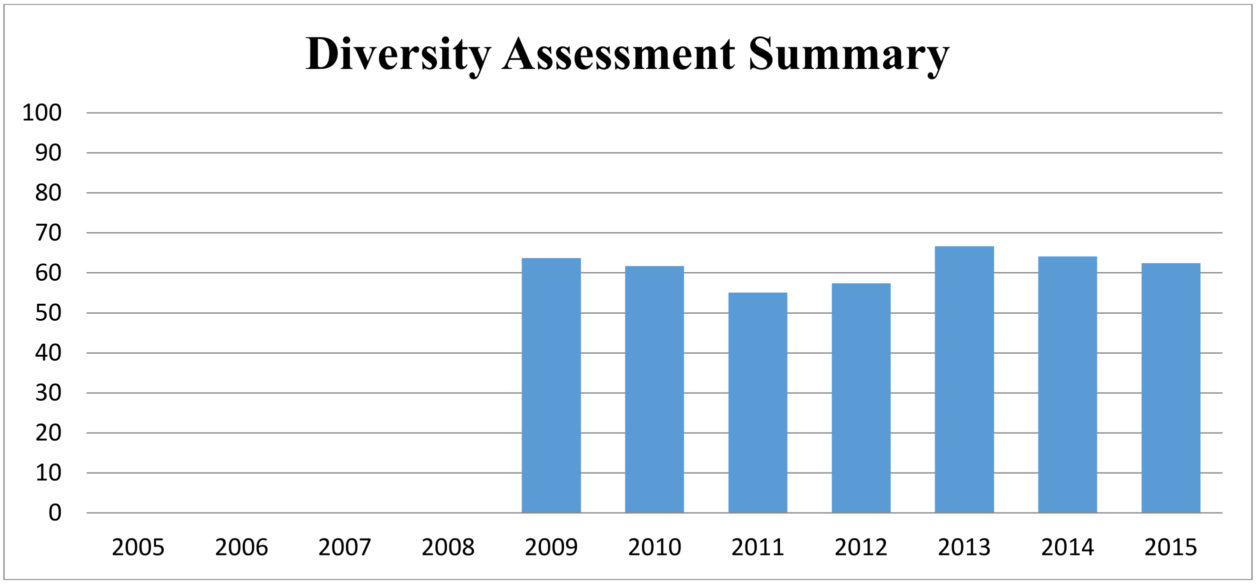

Figure 5-15. Summary of Diversity assessment.

Faculty do watch for relationship issues among students with different backgrounds. A score of around 60 is satisfactory here.

Globalization is presented with a discussion of Thomas Friedman's <u>The World is Flat</u> and the use of ASME materials. Assessment consists of an instructor-developed quiz based primarily on recognizing examples of globalization and on recognizing both sides of the issue – negatives and opportunities. The results show satisfactory understanding. Scores of 90 are satisfactory.

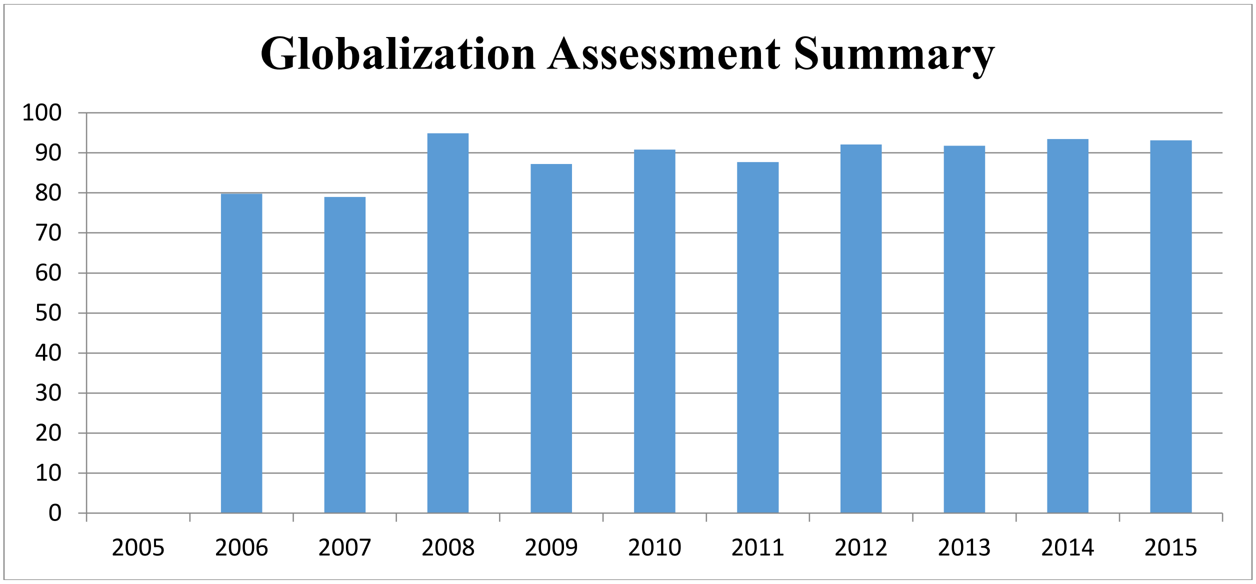

Figure 5-16. Summary of Globalization assessment.

Currently the university's general education policy requires instruction in related areas: Race/Ethnicity/Gender and Global Conscientiousness. The university's on-going redefinition of general education project will hopefully continue to address these issues in a meaningful way.

This outcome will also continue to be reviewed per our Continuous Improvement Plan.

<u>Outcome 8</u>. Understand options to continue their education.

Options to continue education including advanced degrees, engineering versus engineering technology masters, engineering management, MBAs, and other forms of continuing education are discussed in the capstone course. One or more speakers are often brought in to give a presentation on specific masters programs.

Assessment takes place in the form of exit surveys typically handed out at the senior dinner or when seniors turn in their final reports. A recent survey is located at the end of section C of Criterion 4. Results show most, although not all, students have either immediate or future plans for continuing their education. Six (6) of 21 or 29% of the class of 2014 had immediate plans to continue their education while 16 of 21 or 76% had future plans, mostly for master's degrees. This is satisfactory as there is indication of understanding options.

Comment: the Exit Surveys have not been administered consistently in recent years. It may be time to switch to a digital version with enforcement to get results.

<u>Outcome 9</u>. Relate their education to problems in industry.

Direct assessment of this program outcome was added in Summer 2010 in the form of direct questions on the Intern's Evaluation Sheet and on the Supervisor Evaluation – Final form. These are located near the end of Section C of Criterion 4.

Results from the Intern's own evaluation of their experience showed unanimously that all felt they gained appreciation of the "needs of industry." Additionally, all felt that they could see where their curriculum applied to the technology used by their employer. This indicates that the outcome is met.

The summary of the supervisor evaluations of interns showed 100% checking "satisfactory" on overall intern performance and 100% indicating they would accept another intern.

Several other supervisor impressions of interns are assessed. These include attitude/work ethic, relationships, dependability, quality, and technical growth. The barchart below was created by mapping Rikert scale (1-5) scores to percentages. Scores of 4 are all very solid. 80 is the target for these. They will be monitored.

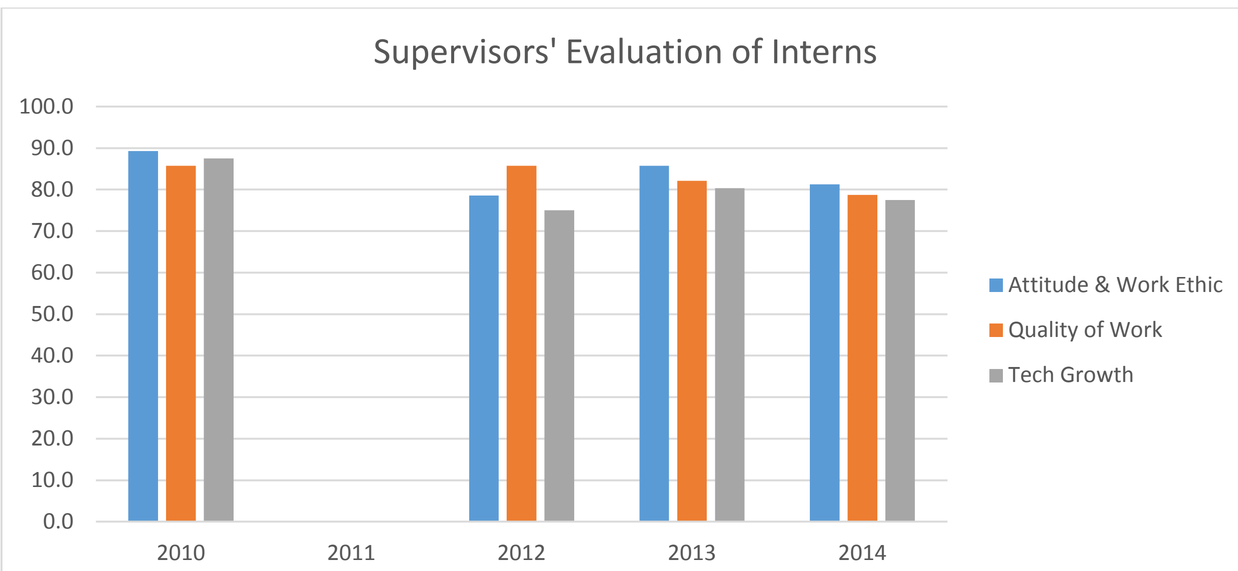

Figure 5-17. Supervisors' Final Evaluation of Interns

The faculty assigned to the internship class visits each student provided they are within a one day drive. During the visit supervisors are interviewed for feedback. For example, supervisors are asked what their understanding of the differences between engineering and engineering technology education is. This past summer (2014) approximately 50% indicated the "correct" understanding of engineering technology being more applied and hands-on vs more theory for engineering education. Most came close and an explanation from the faculty member followed. Employers again indicated that MS Office™ was the most important software for graduates to be able to use – followed by computer-aided design (CAD) software, sometimes mentioning specific CAD programs. Of special interest was the use of geometric dimensioning and tolerancing (GD&T) within their company and location. ASME's Committee on Engineering Technology Accreditation is pushing a requirement for GD&T for all MET programs through ABET. Of the 21 supervisors who gave a response, 6 indicated GD&T was a must, 8 indicated it was used occasionally or in other parts of their company, and 8 indicated it was not used at all.

This feedback on GD&T, combined with the majority of opinions on the MET Advisory Board, suggest MET faculty need to find a way to incorporate GD&T into the curriculum.

Again, exit surveys of MECH393 Industrial Internship students show that they unanimously feel that their experience help them understand the problems of industry – one of the program student outcomes. Most feel that they see how their education applies. Summaries of surveys for the Summer 2013 and Summer 2014 classes appear in separate documents.

DVDFilesMECH\CIP-Assessment\StudentInternshipSurveyResults2013Summer.pdf

DVDFilesMECH\CIP-Assessment\StudentInternshipSurveyResults2014Summer.pdf

Student/Faculty Focus Group on Internships

Third-year students have long been concerned about the cost of the internship course, MECH 393. Students pay for 4 semester hours – a total of $1324 in Summer 2011.

Several students approached the Interim Dean on this issue in Spring 2011. They were listened to, policy was explained, and they were advised to speak with faculty.

The internship coordinator called a meeting with all prospective MECH 393 students in May. The program coordinator and a third faculty member also attended along with about 20 students. Students made it clear that they were very supportive of the internship requirement. However they felt that the 10-week work experience did not justify the cost. They felt the experience would not be academically equivalent to a class. They pointed out that, in spite of Career Services and faculty support, it was unfair that they were ultimately responsible to find an internship and often they had to cover travel costs. Landing an internship can be challenging and time consuming. They also noted that students in other programs essentially did the same work as they did, but received letter grades that would boost most GPAs.

Faculty response included noting that a College of Engineering Technology study group had established the 4-credit hour internship as standard for the College. University-provided support was brought up. This includes: Career Services support (career fairs, resume critique, interviewing practice, search support, etiquette rehearsal) along with the forwarding by faculty of contact information for potential internships and relationship building. Noted also was that, as internships are currently done, the internship coordinator visits each in-state (and some out-of-state) interns and their employer, maintains a portfolio of all weekly reports, and is responsible for assessment. The visits provide networking opportunities and allow faculty to get feedback directly from employers. Faculty present did agree that the cost is a concern and noted that the issue has been raised by students in the past.

Following this meeting, discussion with concerned students involved some course changes. These included changing the course from "Credit/No Credit" to a letter-graded course. Additionally, to make the experience more like a class, students would be required to give a short presentation on their experience to future interns in the fall. The grade basis would essentially involve getting the internship, punctuality with weekly reports and other documents, meeting basic performance requirements, and making the presentation. Supervisors would not be assigning grades.

Action taken: faculty submitted a curriculum change which changed MECH 393 from Pass/Fail to letter graded. This took effect for Summer 2012.

One portion of the program's CIP has been a meeting (focus group) of faculty with students coming off their internships. Requiring a short presentation in order to get credit for the course was discussed as well as requiring participation in a focus group. Reference: MET Continuous Improvement Plan, p. 8.

DVDFilesMECH\CIP-Assessment\MET_CIP_14Sept1615Jun92015Jun22a.pdf

Presently, each Fall the internship instructor and returning interns gather for a focus group discussion on their experiences. In Fall 2014 students indicated satisfaction with their experiences. Some wanted a way to share what they did with underclassmen. Others felt that more automation in their curriculum would be helpful. PFMEA was suggested. For reactions: the student club META did invite each intern to give a very short slide presentation of their experience, the slide presentation they were required to make for the class. Only a couple accepted, however. Holding back grades is being considered to force the presentations.

A faculty discussion came up with the idea of having students record a video of their internship experience. The videos could easily be shared with underclassmen, used at club meetings, and possibly shared with prospective students.

Results: The letter-graded internship has increased student satisfaction. Faculty are considering making internship slide presentation videos mandatory to better close the loop for students and provide insight to underclassmen.

B. Continuous Improvement

Student outcome changes are summarized in discussion of each outcome in Section A of Criterion 4.

For the AAS MET program no significant changes appear to be coming from the quantitative assessments of outcomes. Adjustments need to be made for new faculty and to get data. However, the program is involved and keeping track of potential changes coming through ASME and ABET. An example is the consideration of adding Geometric Dimensioning and Tolerancing (GD&T) to the AAS program. Input from Advisory Board meetings on more than one occasion as well as interviews of intern supervisors support introducing GD&T into the curriculum at some level. The quantitative fact that a vast majority of students completing the AAS program continue to BS programs is a good result. Additionally, voluntary feedback from instructors in 300/400 technical classes where they see students from multiple disciplines in the College is very favorable – that is, MET students as a group are the top major in their classes.

Most of the emphasis on student outcomes is centered around the BS MET program. This is where most MET students complete their education at this institution. Assessment has been directed towards student outcomes. Here, again, quantitative data has generally shown trends, or lack thereof, but has not been the main driver for change. An exception would be the low scores on test questions relating to FFT. There have been several attempts to develop better lab experiences to help understand FFT concepts; time permitting, more will be done.

As mentioned above, MECH 393 Industrial Internship was changed from Credit/No Credit to graded in part from a focus group. The annual focus group continues.

Other outside influence: the decision to use LabVIEW™ software for data acquisition was based on field trip observations – i.e. what is being used by the MET program's constituency namely industry in Michigan. Material for topics such as ethics, diversity, and globalization has come largely from ASME.

The biggest efforts to make changes have been with the capstone projects in MECH 499 Senior Project. The goal is to have students be satisfied with their experience, as well as satisfaction for faculty and Advisory Board reviewers. Feedback comes from all three groups: faculty, students, and Advisory Board members. Issues that have surfaced have been project completion, sufficiently complexity for a capstone, and adequate support for students in terms of equipment and space. All of these are difficult to quantify given the individual nature and wide range of projects involved. Changes implemented have included more faculty pre-screening and adding a 10% "professionalism" factor to grading. A proposal to move 1 credit of the capstone project to Fall Semester has been drafted. Faculty have taken the initiative, sometimes unsolicited, to have more suitable 'build' space as well as lab space available to students and suitable equipment. The program is at least "at the table" on some of the potential changes to building at the institution.

C. Additional Information

Graded exams, project reports, lab reports, and other student work will be available at the time of visit as well as completed grading/scoring rubrics.

Included below, starting with Figure 5-18, are some assessment rubrics for MECH 499 Senior Project and MECH 393 Industrial Internship.

As mentioned earlier, the program DVD has a 24 page yearly tabulation of many of the assessments for MECH 499 Senior Project.

DVDFilesMECH\CIP-Assessment\AssessPDET_MECH499_05_15 2015Jun12.pdf

Also, as mentioned earlier, compilations of student reactions to their internship experiences are on the DVD. Links are repeated.

DVDFilesMECH\CIP-Assessment\StudentInternshipSurveyResults2013Summer.pdf

DVDFilesMECH\CIP-Assessment\StudentInternshipSurveyResults2014Summer.pdf

Senior Project Presentation Evaluation Form   For Faculty Use at Formal Presentations

Project: ______________________________________ Presenter: _______________

Evaluator: ____________________________________ Date: _______

I. Project Evaluation

	5	4	3	2	1
complexity	very involved, many tasks		straight forward		trivial
innovation	very unique		obvious		missed obvious
completeness	thorough		adequate		missing a lot

II. The project represents 150 hours of work

	5	4	3	2	1
.	well above 150 hours		approx 150 hours		completed in past two weeks

III. The project demonstrates the use of coursework in the presenter's major

	5	4	3	2	1
	strong evidence of advanced coursework or tasks from many courses		evidence of tasks from several courses		"shop project"

IV. Presentation Evaluation

	5	4	3	2	1
preparation	complete, down pat, great visuals		ready – several minor glitches		thrown together, wandering through
clarity	very clear		understandable		listener is clueless as to what project was about
time	15-20 minute presentation		within 1 minute		5 minutes under or over
organization	clear objectives, results, and development		can follow		no logical development
eye contact	frequent		some		none
dress	business formal		shirt & tie		grunge

Comments: (use reverse as needed)

Presentation_Evaluation_14b   Acknowledgement to R. Goosen for many parts of this evaluation tool.

Figure 5-18. Rubric used by faculty for MECH 499 Senior Project formal slide presentations.

M.E.T. Senior Project Evaluation Form

MET 01 **Development of a Front Upright Assembly for the 2013 Formula SAE Vehicle**

xxxxxxxx

The 2013 Formula SAE racecar integrates design, manufacturing, and engineering in order to compete in a fierce world-wide competition. The front upright assembly on the vehicle plays a massive role in this. The objective of this project was to implement a successful suspension system while transferring the vehicles dynamics to the ground as efficiently, and efficiently, as possible.

Evaluator: ______________________________ Date: _______

I. Project Evaluation

complexity	5 very involved, many tasks	4	3 straight forward	2	1 simple
innovation	5 very unique	4	3 obvious	2	1 missed obvious
completeness	5 thorough	4	3 adequate	2	1 missing a lot

Overall Impression of Project.

The project represents 140 hours of work to date	5 easily	4	3 possibly	2	1 very little
Project demonstrates the use of coursework in the BSMET program	5 complex analysis/design and/or evidence of use of material from many courses	4	3 evidence of material from 3 or more courses	2	1 little evidence of BSMET courses

II. Communications

clarity	5 very clear	4	3 understandable	2	1 listener is clueless as to what project was about
dress	5 business formal	4	3 shirt & tie	2	1 grunge

Comments: (Use reverse as needed)

Advisory Board Project Evaluation_13Sample

Acknowledgement to R. Goosen for many parts of this evaluation tool.

Figure 5-19. Sample Individual Rubric used by Advisory Board on Project Day

MECH 499 **REPORT GRADE SHEET** cgd rev 5/20/2014 b

Student: ____________________

Title: ____

Date Received: ________________

Mandatory Content: (Incomplete or F if any are missing)

Title Page	___	bibliography	___
Abstract	___	engineering drawing (s)	___
Preface	___	resume	___
Table of Contents	___	printed on 24 lb, 97 US bright paper or similar good paper	___
List of Figures	___	CD or DVD with all files (Word, PPt, Excel, CAD, etc_	___
List of Tables (if there are tables)	___	Credit given where work is others is used	___
Formatted per handout (font, margins, captions, etc)	___	Submitted unbound in a manila folder	___
	___		___

General Considerations for Written Presentation

Compliance to Specified Format	___	/ 20 (-2 per missing item)
General Quality of Written Presentation	___	/ 20 (-1 per errors in 5 page sample)
written presentation sub-total	___	Fail if < 24 points. / 40

Report Content report element total	___	/ 200
Oral Presentation	___	/ 20
Capstone For MET	___	/ 40
REPORT TOTAL	☐	/ 300

GRADE: _______

report_grd_sheet_15Apr27 1

Figure 5-20. First page of rubric used to grade Senior Project reports.

MECH 499 **REPORT GRADE SHEET** **cgd rev 5/20/2014 b**

PROJECT REPORT ELEMENTS

Introduction		____	/ 10
Review of Literature& Research		____	/ 10
Market Analysis	+	____	(+10)
Problem Constraints		____	/ 30
Options			
Analysis of Options			
Pre-Design Analysis		____	/ 30
Design Content		____	/ 30
Analysis (to meet objectives)		____	/ 20
Tolerance Study/GD&T	+	____	(+ 5)
FEA	+	____	(+ 10)
Innovation	+	____	(+ 10)
Testing		____	/ 20
Results (of Project)		____	/ 10
Conclusions		____	/ 10
Recommendations		____	/ 10
<u>Appendices</u>			
Bibliography		____	/ 10
Formal Proposal		____	/ 5
Gant chart		____	/ 5
Components List		____	/ 10
Drawings		____	/ 20
Product Structure /5			
Drawings /10			
Purchased Parts Documentation /5			
Experimental Data		____	/ 15
Patent	+	____	(+10)
Resume		____	/ 5
Report Elements Total		[ ]	/ 200

Note: additional 'points' for outstanding elements – up to 50 pts additional.

report_grd_sheet_15Apr27p2 2

Figure 5-21. Second page of rubric used to grade Senior Project reports

Ferris State University
Mechanical Engineering Technology

Assessment Plan for MECH 499 Senior Project (Capstone)*

Semester:						
Course Objective	Program Outcome and ABET Criteria	Student Evaluation (number)**				
		E (5 pt)	G (4 pt)	A (3 pt)	P (2 pt)	NA (1 pt)
1. Write a proposal for a capstone project that uses material from coursework throughout the curriculum.	BS 1, 2, 3 a, f					
2. Complete a capstone project that demonstrates problem solving, testing, design, and analysis.	BS 1, 2, 5 a, b, c, d, f					
3. Make a formal project presentation.	BS 1, 2, 3 g					
4. Write a comprehensive project report.	BS 1, 2, 3 g					

*Credit is given to the authors of the following paper for the format of this table. "The Next Level in TC2K: Continuous Quality Improvement," S. Scachitti, G. Neff, J. Higley, Purdue University Calumet, Proceedings of the 2004 ASEE Annual Conference and Exposition.

**Students' self-evaluation on how well they learned each objective.

Student_MECH499_Assess07May1b 1

Figure 5-22. Student self-assessment rubric for assessed outcomes from MECH 400 Senior Project. Note that the ABET outcomes referred to are not the current a-k student outcomes.

Mechanical Engineering Technology Industrial Internship

INTERN'S EVALUATION SHEET

To be completed at the end of your internship

Intern's Name: ______________________ Company Name: ______________________

Company Address: ____

Please check the appropriate evaluation for each category. Your comments will be kept confidential.

A. Did your experience give you a better idea of the needs of industry?
___ Y
___ N

B. Did you have to adapt to new technologies, software, tools, or processes?
___ Y
___ N – nothing new

C. Did you use some of your coursework directly in your work?
___ nearly all of my activity
___ part of each day
___ occasionally
___ rarely
___ never

D. Could you see where some of your coursework is related to the development and application of the business's technology.
___ applications of MET coursework are everywhere
___ frequent
___ some applications are evident
___ very little
___ nothing from MET appears to be relevant

E. Technical growth during internship
___ extraordinary grasp/utilization of new knowledge
___ gained solid competence in new knowledge
___ gained some new skills/knowledge
___ gained little new skills/knowledge
___ no technical growth

F. Rate your business sense growth during the internship?
___ eye opening
___ all of my work was related to me by supervisors in terms of business goals
___ gained understanding of business's goals
___ little involvement or awareness of business issues
___ completely unaware

G. What percent of your time was spent with meaningful work? (vs "busy work" to keep you out of the way)
___ 100%
___ 80%
___ 60%
___ 40%
___ None

H. Did your productivity increase during your internship?
___ Definitely
___ A lot
___ Some
___ Little
___ Not at all

I. Relations with others
___ exceptionally well accepted
___ worked well with others
___ got along satisfactorily
___ some difficulty working with others
___ consistently did not get along or not accepted

J. Were you satisfied with your experience?
___ Extremely – perfect
___ Very pleased
___ Satisfied
___ Unsatisfactory
___ Not acceptable

InternEval2014Jan29p1

Figure 5-23. Intern Experience Evaluation Survey, p. 1.

Mechanical Engineering Technology Industrial Internship

Would you recommend the position for someone else looking for an internship? ________________
(if no, why not)

Any concerns:

Recommendations:

Additional Comments:

Please return this evaluation after your tenth week to:

Brian Brady Ferris State University
Mechanical Design Department
915 Campus Drive, Swan 405
Big Rapids, Michigan 49307

or E-mail to: bradyb@ferris.edu

Thank you for your cooperation!

InternEval2014Jan29p2

Figure 5-24. Intern Experience Evaluation Survey, p. 2.

BSMET GRADUATE SURVEY – FOURTH YEAR STUDENTS May 2014

Name	
Summer Address	
Permanent Address	
e-mail address	
phone (cell)	
Employment Plans	
	My employment is suitable for my program. (1-5) **1 low 5 high or N.A. ________**
Plans for Further Education	**Immediate**
	Future:
Why I entered the MET program?	
How has the MET program helped me?	
Have my expectations of this program been met?	
Recommendations	

GRADUATE SURVEY_BSMET_14

Figure 5-25. Sample exit survey for seniors in BS MET.

6. CRITERION 5. CURRICULUM

A. Program Curriculum

1. *Complete Table 5-1 that describes the plan of study for students in this program including information on course offerings in the form of a recommended schedule by year and term along with average section enrollments for all courses in the program over the two years immediately preceding the visit. State whether you are on quarters or semesters and complete a separate table for each option in the program.*
2. *Describe how the curriculum aligns with the program educational objectives.*
3. *Describe how the curriculum and its associated prerequisite structure support the attainment of the student outcomes.*
4. *Attach a flowchart or worksheet that illustrates the prerequisite structure of the program's required courses.*
5. *For each curricular area specifically addressed by either the general criteria or the program criteria as shown in Table 5-1, describe how your program meets the specific requirements for this program area in terms of hours and depth of study.*
6. *If your program has a capstone or other culminating experience for students specifically addressed by either the general or program criteria, describe how this experience helps students attain the student outcomes.*
7. *If your program allows cooperative education to satisfy curricular requirements specifically addressed by either the general or program criteria, describe the academic component of this experience and how it is evaluated by the faculty.*
8. *Describe by example how the evaluation team will be able to relate the display materials, i.e. course syllabi, textbooks, sample student work, etc., to each student outcome. (See the 2015-2016 APPM section II.G.6.b.(2) regarding display materials.)*

Table 6-1. Curriculum

Mechanical Engineering Technology
The AAS MET program consists of Year 1 and Year 2.
The BS MET program includes all four years.

Course (Department, Number, Title) List all courses in the program by term starting with first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective, or a Selective Elective by an R, an E or an SE[2]	*Curricular Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester	Average Section Enrollment for the Last Two Terms Course was Offered[1] (Lecture only unless noted.)
		Math & Basic Sciences	Discipline Specific Topics	General Education	Other		
Year 1 Fall Semester							
MECH 111 MET Seminar	R		1			F 14	30
ETEC 140 Engineering Graphics	R		3			F 14, Sp 15	24
MFGT 150 Manufacturing Processes	R		2			F 14, Sp 15	40 lec, 15 lab
ENGL 150 English 1	R			3		F 14, Sp 15	23 typ
MATH 116 Intermediate Algebra	R	4				F 14, Sp 15	31
Cultural Enrichment Elective	SE			3		F 14, Sp 15	n.a.
FSUS 100 FSU Seminar	R[1]				1	F 13, F 14*	18[2]
Year 1 Spring Semester							
MECH 122 Computer Apps 1 for Technology	R		2			F 14, Sp 15	22
ENGL 250 English 2	R			3		F 14, Sp 15	23 typ
PHYS 211 Intro. to Physics 1	R	4				F 14, Sp 15	96 lec, 24 lab
MATH 126	R	4				F 14, Sp 15	26
Social Awareness Elective	SE			3		F 14, Sp 15	n.a.
Year 2 Fall Semester							
MECH 211 Fluid Mechanics	R		4			F 13, F 14	29 lec, 14 lab

Course (Department, Number, Title) List all courses in the program by term starting with first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective, or a Selective Elective by an R, an E or an SE[2]	*Curricular Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester	Average Section Enrollment for the Last Two Terms Course was Offered[1] (Lecture only unless noted.)
		Math & Basic Sciences	Discipline Specific Topics	General Education	Other		
MECH 340 Statics & Stgths. of Mat'ls	R		4			F 14, Sp 15	39
MECH 341 Statics & Stgths. of Mat'ls Lab	R		1			F 13, F 14	14 lab
CHEM 114 Intro to General Chemistry[3]	R	4				F 14, Sp 15	96 lec, 24 lab
MATH 216 Applied Calculus	R	4				F 14, Sp 15	30 typ
Year 2 Spring Semester							
MECH 212 Kinematics of Mechanisms	R		2			Sp 14, Sp 15	31
MECH 222 Machine Design	R		4			Sp 14, Sp 15	23
MECH 223 Thermodynamics	R		3			Sp 14, Sp 15	25
EEET 201 Electrical Fundamentals	R		3			F 14, Sp 15	39 lec, 15 lab
COMM 121 Fundamentals of Public Speaking	R			3		F 14, Sp 15	28 typ
Year 3 Fall Semester							
MECH 311 Finite Elem. Analysis/Solid Modeling	R		2			F 13, F 14	21 lab
MECH 330 Heat Transfer	R		3			F 13, F 14	31
MATL 240 Intro to Material Science	R	4				F 14, Sp 15	44 lec, 16 lab
MFGE 341 Quality Science Statics	R	3				F 13, F 14	28
PHYS 212 Introductory Physics 2[3]	R	4				F 14, Sp 15	70 lec, 23 lab
Year 3 Spring Semester							
MECH 322 Computer Apps 2	R		2			Sp 14, Sp 15	17 lec-lab
MECH 332 Mechanical Measurements/Mechatronics	R		3			Sp 14, Sp 15	47 lec, 13 lab
MECH 360 Dynamics	R		3			Sp 14, Sp 15	28
MFGE 423 Engineering Economics	R		2			F 14, Sp 15	30
MATH 226 Fourier Series & Appl. Diff. Equ.	R	4				Sp 14, Sp 15	24

Course (Department, Number, Title) List all courses in the program by term starting with first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective, or a Selective Elective by an R, an E or an SE[2]	*Curricular Area (Credit Hours)* Math & Basic Sciences	Discipline Specific Topics	General Education	Other	Last Two Terms the Course was Offered: Year and, Semester	Average Section Enrollment for the Last Two Terms Course was Offered[1] (Lecture only unless noted.)
Cultural Enrichment Elective	SE			3		F 14, Sp 15	n.a.
Year 3 Summer Semester							
MECH 393 Industrial Internship	R		4			Su 14, Su 15	28[4]
Year 4 Fall Semester							
MECH 421 MET Senior Lab	R		4			F 13, F 14	37 lec, 15 lab
MECH 440 Noise & Vibration	R		3			F 13, F 14	30
MATL 341 Material Selection	R		3			F 14, Sp 15	31
Approved Technical Elective	SE		3			F 14, Sp 15	varies 30 typ
Social Awareness Elective	SE			3		F 14, Sp 15	n.a.
Year 4 Spring Semester							
MECH 499 Senior Project	R		3			Sp 14, Sp 15	33 lac, 22 lab
ENGL 311 Advanced Technical Writing	R			3		F 14, Sp 15	23 typ
Approved Technical Elective	SE		3			F 14, Sp 15	varies 30 typ
Cultural Enrichment Elective	SE			3		F 14, Sp 15	n.a.
Social Awareness Elective	SE			3		F 14, Sp 15	n.a.
1. FSUS 100 FSU Seminar is required of all first-time-in-college students only. It is not counted in the total here. *2. Average size for sections of FSUS 100 set aside for MECH students.* *3.PHYS 212 may be substituted for CHEM 114 in the AAS program. PHYS 211, PHYS 212, and CHEM 114 are required for the BS program.* *4. MECH 393 Internship is offered all semesters. Averages for Summer 2014-15 are shown.*							
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE	132						
PERCENT OF TOTAL		*26.5%*	*50.7%*	*22.7%*	**		

1. Curriculum Alignment with Program Educational Objectives

Program Objectives are listed under Criterion 2.

AAS MET

1. a. …continue to a bachelor degree in MET or other discipline.

The AAS MET curriculum includes math through calculus, two physical sciences courses, and 9 hours of communications – all providing solid foundation for continuing to bachelor degree programs. The addition of engineering sciences including statics, strength of materials, fluid mechanics, thermodynamics and electric circuits/electronics as well as applied engineering courses such as machine design and kinematics provide a very solid start for the BS MET program or BS in other engineering technology programs.

1. b. … find suitable employment

While very few students leave after two years, the above skills along with CAD and the introduction to manufacturing course give AAS graduates an opportunity to start with a technology based employer.

BS MET

1. …..find employment appropriate to the discipline

The foundational courses above, plus further engineering sciences and applied engineering in the BS program give graduates the ability to work with more complicated problems based on their exposure to analytic and experimental methods used in engineering. The required internship provides a substantial addition to their experience. The required capstone forces them to take charge of a project and manage their time and resources.

2.…further their education

Options to further education, such as MS technical, MBA, and recognized certifications are discussed in MECH 499 Senior Project.

3. be able to advance

The challenging curriculum should get graduates off to a good start in their careers. Options, such as technical tracks vs management tracks are discussed in the capstone course.

2. Relationship of Curriculum and Prerequisite Structure to Attainment of Student Outcomes

Student Outcomes are listed here with commentary on each.

AAS MET STUDENT OUTCOMES

At the time of graduation, AAS MET students will be able to:

1. apply engineering principles to technical challenges and opportunities

   The solid engineering science and applied engineering core of the program is designed to meet this outcome.

2. carry out an experimental study of a component including data collection, analysis, oral presentation, and written report

   MECH 211 Fluid Mechanics along with MECH 341 Lab for Statics and Strength of Materials are the key MECH classes with data collection and analysis labs. Additional labs with data collection and analysis include EEET Electrical Fundamentals, PHYS 211 Introductory Physics, and the second science class, Phys 212 or CHEM 114.

3. demonstrate communication skills - oral, written, and visual

   Nine hours of communications are built into the AAS program. Additionally, oral and written reports are required throughout the program.

4. demonstrate ability to work on teams

   Starting with MECH 111 MET Seminar, students often work in teams for labs and classroom projects and other assignments.

5. demonstrate understanding of ethical issues in their discipline

   Following discussion, students are given an assignment relating to codes of ethics for professionals.

6. broaden their background with study in humanities and social sciences

   This is covered by university general education requirements for AAS programs.

7. understand options to continue their education.

   MECH 111 includes discussion of options after the AAS degree.

BS MET STUDENT OUTCOMES

At the time of graduation, BS MET students will be able to:

1. apply engineering principles to complex technical challenges and opportunities

   The curriculum increases in academic challenge throughout. The capstone enables students to demonstrate their ability.

2. carry out a capstone engineering project involving design, testing, analysis, presentation, and reporting

   MECH 499 Senior Project fulfills this outcome.

3. demonstrate communication skills, oral, written, and visual, including a formal oral presentation

   There are 12 semester hours in communications as part of the university's general education requirements. Students write short papers and give oral presentations throughout the curriculum. The capstone course requires all of these items.

4. demonstrate ability to work on teams

   As with the AAS MET program, starting with MECH 111 MET Seminar, students often work in teams for labs and classroom projects and other assignments.

5. demonstrate proficiency in the modern tools of the discipline

   CAD, spreadsheets, computer programming, data acquisition, and simulation software are all built in. Modern tools are expected in the capstone course.,

6. demonstrate understanding of ethical issues in their discipline

   Ethics is specifically covered in MECH 111 and MECH 499. ASME Code of Ethics is used in MECH 499. The study of ethics can be a general education course as well.

7. relate issues in diversity and globalization to their discipline

   Diversity and global consciousness are part of the general education requirements of the university. These concepts, with the help of materials from ASME, are reinforced in the capstone course, MECH 499.

8. understand options to continue their education

This is a discussion topic in MECH 499. Additional students are exposed to faculty and other professionals who have continued their education.
‘

9. relate their education to problems in industry.

   MECH 393 Industrial Internship is a required course. Outcome 9 is one of the main reasons for requiring the internship course. Students have a much better understanding of their curriculum on return.

3. Flowchart for Prerequisite Structure of the Programs Required Courses

The flow chart below shows the prerequisite structure for both the AAS and BS MET curricula. Flow is always left-to-right. Courses are laid out in the standard semester-to-semester plan.

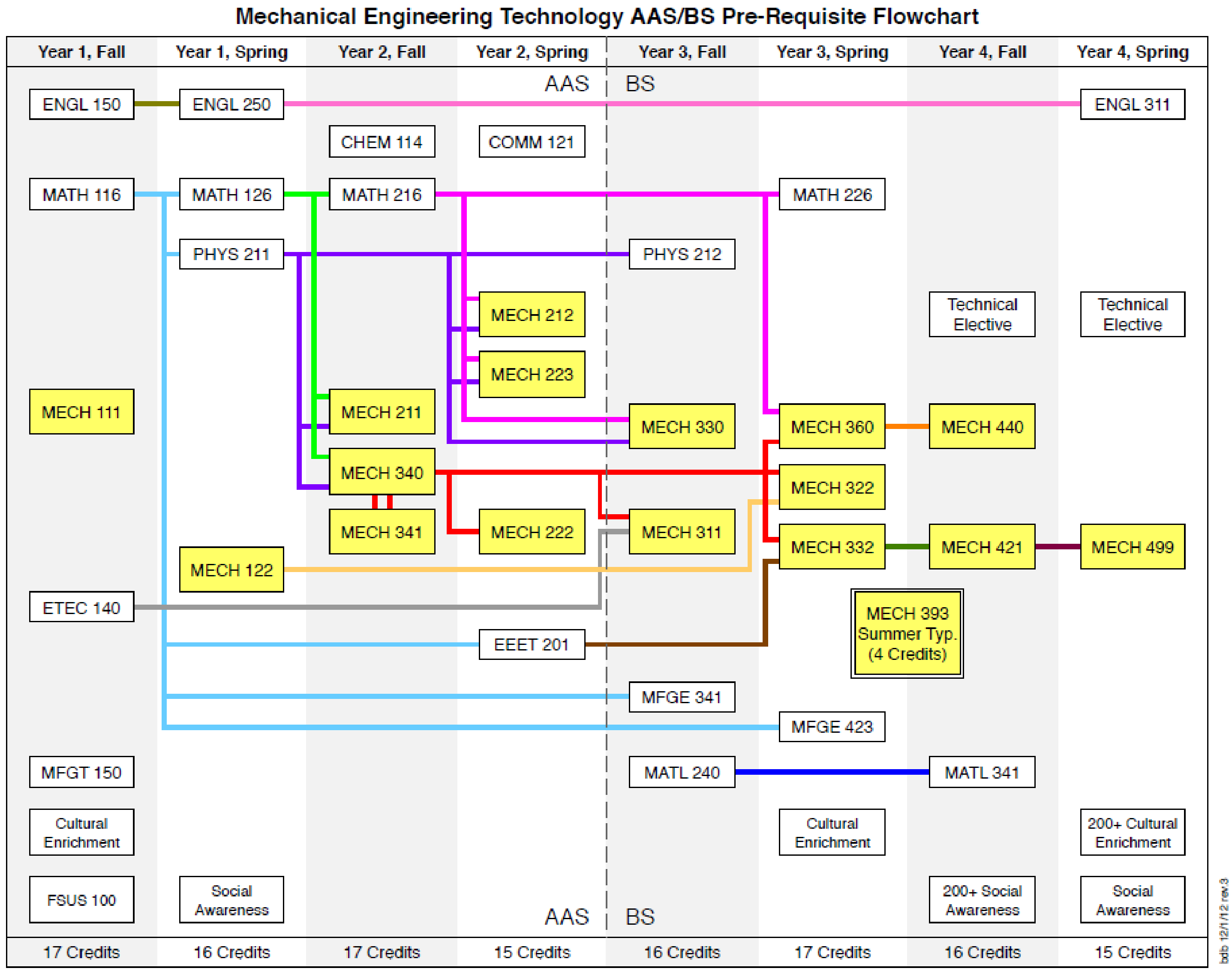

Figure 6-1. Prerequisite Flow Chart for AAS and BS MET Programs

4. Specific Requirements for Programs in Terms of Hours and Depth of Study

Briefly,

Criterion 5 gives curriculum requirements for all ETAC programs.

Math	
a. AAS math must include algebra and trigonometry	AAS MET requires these plus calculus
b. BS math must include differential and integral calculus or other math above algebra and trigonometry	BS MET requires two semesters of calculus as well as statistics. Calculus is used more for understanding in some courses, but is used rigorously in MECH 360 and 440.
Technical Content	
a. Technical content must range between 1/3 and 2/3 of the curriculum	AAS. Technical content: 29 of 64, (45%) of the required credits BS. Technical content: 67 or 132, 51% or the required courses
b. Technical core that prepares students for increasingly complex technical specialties later in curriculum	This is clearly seen on the Prerequisite Flow sheet, Figure 5-1.
c. Develop student competency in the use of equipment and tools common to the discipline.	The many lab experiences allow students to become familiar with the many tools, both physical and digital, used in the discipline.

Program Specific Criteria from ASME:

The outcomes statement from ASME is broad reflecting the broad nature of the discipline. All are required to "demonstrate an applied basis in engineering mechanics/sciences." No specific number of credits are given.	The MET programs encompass most of the topics listed. AAS includes coursework in statics, strength of materials, and kinematics with reinforcement in machine design. BS adds dynamics and courses based on mechanics including FEA, mechanical measurements, and noise and vibrations.

5. Describe How the Capstone Helps Students Attain Student Outcomes

The capstone course, with its individually run projects, is tied to all outcomes except teamwork. Students use their engineering graphics and analytic skills to come up with preliminary designs. Feasibility and sizing are involved. They build and test their systems or components and report both orally and in writing. Professionalism in the form of timeliness and appearance is stressed. Ethics, diversity, globalization, and continuing education are also included with in-class only exercises.

6. Describe Academic Component of Internship and How Evaluated By Faculty

Faculty visit each internship site that is within a reasonable distance from the university for feedback. Those more distant do phone interviews with the faculty coordinator. Students are graded on timeliness on submitting reports, evaluations, and presentations. Rikert scale surveys are completed by students and their supervisors on many professional characteristics of their experiences.

7. Example of How Evaluation Team Will Be Able to Relate the Display Materials to Each Student Outcome

There will be many examples of assessed student work that is related to student outcomes. As an example, BS MET Program Outcome 2 "… carry out a capstone engineering project involving design, testing, analysis, presentation, and reporting" has many assessments. Example of poor, good, and excellent project reports along with grading sheets will be available. BS MET Program Outcome 6 "   demonstrate understanding of ethical issues in their discipline" will have similar examples of student demonstrating what is done with this outcome.

B. Course Syllabi

Course syllabi in the requested format have been included for all MECH courses plus ETEC 140 Engineering Graphics. Other syllabi in similar format can be made available on request.

C. Advisory Committee

The MET Industrial Advisory Committee consists of nine volunteers from industry and one who works in plant engineering at this institution. Seven are alumni of the AAS MET program, graduating before the BS MET was available. Four of these alumni have BS degrees in other disciplines from this institution while three earned BS degrees from other institutions. Three board members have not been students in MET. Companies represented include a variety of manufacturing interests including automotive and packaging, the institutions plant engineer, and a utility. All members have technical BS or MS degrees. All are presently involved with technology except one who is now self-employed in farming and real estate. Their names and affiliations are also posted in the MET sections of the university catalog. Here is a link to a document with their names and affiliations.

DVDFilesMECH\AdvisoryBoard\MECHAdvlist2015Apr20.pdf

http://www.ferris.edu/HTMLS/colleges/technolo/ceems/mece/homepage.htm

The MET advisory board assists in directing the program's curriculum and outcomes. Faculty give a brief report to the Board during the annual meeting. Board members spend time with students sharing thoughts and looking for input. Board members also review senior capstone projects during a poster session. The input from the advisory board aids the programs in adapting to changing conditions in industry, technology and the graduate environment. Their input is discussed in Criterion 4 Continuous Improvement.

The Board has reviewed the programs Early Career Objectives (PEOs) and Student Outcomes. Changes have been made. They have had input to coursework, especially the capstone project and have provided resources such as internships, field trip, equipment, materials, and monetary donations.

Minutes of meetings will be available at the site visit or upon request.

7. CRITERION 6. FACULTY

A. Faculty Qualifications

The faculty for MET consists of four individuals. Three hold master degrees in Mechanical Engineering, one holds a PhD in Mechanical Engineering, and one is also a Registered Professional Engineer. The MET faculty members have a combined experience of 64 years working in industry and government labs. Two have strong experience in product development, one in manufacturing and processes, and the fourth in thermal research. They have a combined teaching experience of over 60 years.

Adjunct faculty have excellent backgrounds for what they teach. All three adjunct faculty that teach ETEC 140 Engineering Graphics have worked in a local industry where they design and detail commercial furniture products. Engineering graphics, CAD in particular, are part of their daily work.

B. Faculty Workload

A "full load" for faculty is defined by contract as the greater of 24 semester hours or 36 contact hours or 720 student credit hours (SCH) per year. Release time for the program coordinator has ranged from ¼ to ½ load with ½ load being the most recent. All MET faculty have been teaching above full load, based on credit hours or contact hours, for the past three years.

Additional work comes from advising students. Faculty meet each semester with advisees to go over their progress and release their advising holds. Advising is not factored into load. MET faculty have had an average of 53 advisees during 2014-15 and 69 advisees during 2013-14, both well above the university and college averages.

Additional duties involve maintenance of labs, advisory board relationships, and assessment.

Voluntary activity includes service on school, college, and university committees and serving as advisors to student organizations. These activities are impacted by teaching loads.

C. Faculty Size

Currently all MET faculty are on overload. The program coordinator is given 50% release time to cover administrative functions for both the MET programs as well as the Energy Systems Engineering program. The university's administration has recognized the need for an additional faculty member; a search continues.

In addition to overloads, there has been at least one full-time equivalent (FTE) of MET faculty load covered either by adjunct faculty or under-loaded faculty from other programs. This includes ETEC 140 Engineering Graphics as well as an Energy Systems course on a rotating basis (Three ENGY courses are taught in alternate years. Hence there is a ENGY class in three of every four semesters.)

The overloads take their toll in time and adjunct faculty do not help with advising or voluntary activities such as committees or student clubs.

As mentioned, a fifth position in MET has been authorized and the search continues. With such a person, adjuncts will still be needed and some MET faculty will continue to be on overload.

D. Professional Development

Mr. Brady

Jossey-Bass Online Teaching and Learning (OTL) Online Conference, October 2009
Conference to share and learn best practices for online, mixed delivery, and web enhanced courses.

FerrisConnect BlackBoard Learn Training and Early Adopter, June 2011
Week long training session on how to use the tools available in Blackboard Learn for web enhanced and mixed delivery courses, focusing primarily on the differences from WebCT. One of approximately 25 faculty in the University who adopted Blackboard Learn during the beta phase for the year prior to the full University roll-out.

BlackBoard Calculated Questions Ad-Hoc Group, Fall 2011 – Spring 2012
Small group of faculty and FCTL staff who investigated weaknesses and possible solutions and work arounds for the Blackboard Learn implementation of calculated questions for use in automatically graded numeric based student assessments. One of the groups suggestions was to investigate, implement, and integrate the use of Maple TA with the Blackboard environment.

Siemens Mechatronics Level 1 Instructor Training, June 2012
Two week long "train the trainer" session for instructors of Mechatronics type courses. Siemens offers three levels of Mechatronics certification to students and industrial workers worldwide. Instructors taking this class are eligible to teach the Level 1 material to their institution's students so they may sit for the certification exam.

Mr. Drake

ASEE Annual Conference, Seattle, WA, June 14-17, 2015
- Participate in ASME Mechanical Engineering Technology Leadership Committee meeting (immediate past chair)
- Participate in Engineering Technology National Forum advocacy meeting.

- Sessions on ETAC Accreditation and Capstone projects
- Work on Self-Study

ASEE Annual Conference, Indianapolis, IN, June 15-18, 2014
- Chair ASME MET Leadership Committee meeting
    - Updates from ASME CETA, AASMET Curriculum Study, Initiatives
- Meetings: Engineering Technology National Forum,
- Sessions: ET Capstones, STEM, ET Education, New Course Development in ET, Mechanics Hands-On Demos – Show & Tell

ASME M. E. Educational Leadership Summit, Newport Beach, CA, March 12-14, 2015
- Sessions on federal programs in manufacturing, 3-D printing, Ben Sparks Award for capstones, Sustainable & Energy Efficient Manufacturing
- Meeting of ASME Committee on Engineering Accreditation (member)
    - Issues of PEV qualifications, use of term "applied engineering,", MET criteria changes in process

ASME M. E. Educational Leadership Summit, San Juan, Puerto Rico, March 12-15, 2014
- Sessions on innovation, entrepreneurship, diversity, globalization
- Meeting of ASME Committee on Engineering Accreditation (member)

ABET Commission Week, Arlington, VA July 8-13, 2014
- Committee/commission actions on 2013-14 visits and reports
- Team Chair refresher training
- Meeting with institutions
- Also ASME CETA semi-annual meeting

Dr. Siahpush

ASME IMECH, Montreal, ON November 15-21, 2014
- Heat Transfer Division Exec Committee, attendee
    - Issues on collaboration with other organizations, ASME reorganization
- Heat Transfer Division Journal Ed. Brd, elected Associate Editor
- Other Heat Transfer meetings
- Reception for Women in Engineering – panel on increasing representation of women
- Presented Paper: "Scale Analysis and Experimental Results of a Solid/Liquid Phase-Change Thermal Energy Storage System"
- Sessions on Globalization, Accreditation, Experiments, Problem Solving, Phase Change Heat Transfer

Trip reports are available for most off-campus professional development.

E. Authority and Responsibility of Faculty

Curriculum changes are initiated typically by faculty. These changes can range from simple technical changes such as course number or prerequisite to complete program modifications or completely new programs. Curriculum change proposals are passed on to the school curriculum committee regardless of the vote outcome of the program faculty. The proposal is reviewed by the faculty that make up the school committee. The school committee votes and, regardless of the vote, the measure go to the school director. The school director the proposal, and support or not, passes it on to the college curriculum committee. This committee is comprised of faculty of the College of Engineering Technology. Following a vote by the college committee, proposals are forwarded to the Dean. The Dean may stop a proposal at this point, or forward the proposal to the University Senate. The University Curriculum Committee (UCC) of the Academic Senate reviews proposals for the Senate. Major proposals go to the full Senate while the UCC acts on minor proposals on behalf of the Senate. Regardless of vote, proposals go to the Provost who may support or stop them. This procedure provides academic input for the faculty in the curriculum process at all stages of the process with administrative control.

Faculty, often with input from the Industrial Advisory Board, review and update program educational objectives and student outcomes. Changes may be suggested by either group; changes are made and published once consensus takes place. Faculty implement changes once consensus is reached.

Table 7-1. Faculty Qualifications

Mechanical Engineering Technology, AAS and BS

Faculty Name	Highest Degree Earned- Field and Year	Rank [1]	Type of Academic Appointment[2] T, TT, NTT	FT or PT[3]	Years of Experience: Govt./Ind. Practice	Years of Experience: Teaching	Years of Experience: This Institution	Professional Registration/ Certification	Level of Activity[4] H, M, or L: Professional Organizations	Level of Activity[4] H, M, or L: Professional Development	Level of Activity[4] H, M, or L: Consulting/summer work in industry
Brian Brady	M.S. Mechanical Engineering, University of Illinois, 1991	ASC	T	FT	16	9	9		L	M	L
Chuck Drake	M.S. Mechanical Engineering, Michigan Technological University, 1992	P	T	FT	13	27	24	PE, Michigan and Virginia	H	M	L
Ali Siahpush	PhD Mechanical Engineering, University of Idaho, 2001 ,	ASC	TT	FT	24	7	2		H	H	M
Randy Stein	M.S. Mechanical Engineering, Mechanical Engineering,	P	T	FT	11	25	17		L	L	L

	Michigan Technological University, 1981										
Matthew Crosson	MBA, Ferris State, 2005 B.S. Product Design Engineering Technology, Ferris State, 2002 A.A.S. Mechanical Engineering Technology, Ferris State, 1997	I	A	PT	18	4	4		L	L	H
Aaron Hampel	B.S. Mechanical Engineering Technology, Ferris State, 2005	I	A	PT	10	1	1		L	L	L
Brady Ward	B.S. Product Design Engineering Technology, Ferris State, 2010	I	A	PT	5	1	1		L	L	L

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
2. Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track
3. At the institution
4. The level of activity, high, medium or low, should reflect an average over the year prior to the visit plus the two previous years.

Table 7-2. Faculty Workload Summary

Mechanical Engineering Technology, AAS and BS

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Brian Brady	FT	MECH 111 002 1 cr (1 lec 0 lab) F14	100%			100%
		MECH 122 001 2 cr (2 lec 0 lab) F14				
		MECH 122 002 2 cr (2 lec 0 lab) F14				
		MECH 311 301 2 cr (0 lec 6 lab) F14				
		MECH 311 302 2 cr (0 lec 6 lab) F14				
		MECH 341 301 1 cr (0 lec 2 lab) F14				
		MECH 341 302 1 cr (0 lec 2 lab) F14				
		MECH 341 303 1 cr (0 lec 2 lab) F14				
		MECH 341 304 1 cr (0 lec 2 lab) F14				
		MECH 122 001 2 cr (2 lec 0 lab)				
		MECH 122 002 2 cr (2 lec 0 lab) Sp15				
		MECH 122 003 2 cr (2 lec 0 lab) Sp15				
		MECH 212 001 2 cr (2 lec 0 lab) Sp15				
		MECH 212 003 2 cr (2 lec 0 lab) Sp15				
		MECH 212 004 2 cr (2 lec 0 lab) Sp15				
		MECH 322 211 2 cr (1 lec 3 lab) Sp15				
		MECH 322 221 2 cr (1 lec 3 lab) Sp15				
		MECH 332 211 1 cr (0 lec 3 lab) Sp15				
		MECH 332 212 1 cr (0 lec 3 lab) Sp15				
Chuck Drake	FT	MECH 421 211 4 (3 lec 3 lab) F14	50%		50%	95%**
		MECH 421 212 1 (0 lec 3 lab) F14				
		MECH 421 213 1 (0 lec 3 lab) F14				
		MECH 332 213 3 cr (2 lec 3 lab) Sp15				
		MECH 499 211 3 cr (2 lec 3 lab) Sp15				

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
		MECH 499 212 1 cr (0 lec 3 lab) Sp15				
Ali Siahpush	FT	MECH 211 211 4 (3 lec 3 lab) F14	100%			100%
		MECH 211 212 1 (0 lec 3 lab) F14				
		MECH 211 221 4 (3 lec 3 lab) F14				
		MECH 211 222 1 (0 lec 3 lab) F14				
		MECH 330 001 3 (3 lec 0 lab) F14				
		MECH 330 002 3 (3 lec 0 lab) F14				
		MECH 223 001 3 cr (3 lec 0 lab) Sp15				
		MECH 223 002 3 cr (3 lec 0 lab) Sp15				
		MECH 250 211 2 cr (1 lec 2 lab) Sp15				
		MECH 250 212 1 cr (0 lec 2 lab) Sp15				
		MECH 250 213 1 cr (0 lec 2 lab) Sp15				
		MECH 250 221 2 cr (1 lec 2 lab) Sp15				
		MECH 250 222 1 cr (0 lec 2 lab) Sp15				
		MECH 250 223 1 cr (0 lec 2 lab) Sp15				
Randy Stein	FT	MECH 340 001 4 (4 lec 0 lab) F14	100%			100%
		MECH 340 002 4 (4 lec 0 lab) F14				
		MECH 340 003 4 (4 lec 0 lab) F14				
		MECH 440 001 3 (3 lec 0 lab) F14				
		MECH 222 001 4 cr (4 lec 0 lab) Sp15				
		MECH 222 002 4 cr (4 lec 0 lab) Sp15				
		MECH 340 001 4 cr (4 lec 0 lab) Sp15				
		MECH 360 001 3 cr (3 lec 0 lab) Sp15				
		MECH 360 002 3 cr (3 lec 0 lab) Sp15				
Matt Crosson	PT	ETEC 140 211 3 (2 lec 3 lab) F14	100%			
		ETEC 140 231 3 (2 lec 3 lab) F14				
		ETEC 140 211 3 cr (2 lec 3 lab) Sp15				

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Aaron Hampel	PT	ETEC 140 221 3 (2 lec 3 lab) F14	100%			
		ETEC 140 241 3 (2 lec 3 lab) F14				
Brady Ward	PT	ETEC 140 251 3 (2 lec 3 lab) F14	100%			
		ETEC 140 221 3 cr (2 lec 3 lab) Sp15				

**Mr. Drake's 50% release time was split between the MET programs and the Energy Systems Engineering program. A rough estimate would be 9/10 of his release time with MET, 1/10 of his release time with Energy Systems.

1. FT = Full Time Faculty or PT = Part Time Faculty, at the institution
2. For the academic year for which the Self-Study Report is being prepared.
3. Program activity distribution should be in percent of effort in the program and should total 100%.
4. Indicate sabbatical leave, etc., under "Other."
5. Out of the total time employed at the institution.

Full load is defined in the contract between the institution and the Ferris Faculty Association as being the minimum of:

- 24 semester hours of credit
- 36 contact hours
- 720 student credit hours

over the 9 month academic year. DVDFilesMECH\Faculty Documents\2014-04-04 SIGNED FFA CONTRACT.pdf

For the reporting year and previous two years, each full time faculty member has been on overload.

2014-15 MECH Overloads: 24 credits, 31 contact hours
2013-14 MECH Overloads: 15 credits, 24 contact hours with one 4 cr course taken as overload by non-MET faculty
2012-13 MECH Overloads: 9* credits, 12* contact hours with a one-semester adjunct teaching 6 credits, 12 contact hours.

The overloads take can be demanding on time.

8. CRITERION 7. FACILITIES[1]

A. Offices, Classrooms and Laboratories

1. *Offices (such as administrative, faculty, clerical, and teaching assistants) and any associated equipment that is typically available there.*

   The administrative offices for the MET programs are located in the Swan Technical Arts Building. The primary administrative office, Swan 405, houses the academic secretary and program coordinator as well as faculty mailboxes, office supplies, and copy machine. A second administrative office is located in Swan 312 where the financial secretary and school director have offices. Swan 312 has a conference room and copy machine. Most lecture rooms and all laboratories used by the MET program are in the Swan Building as well.

   Faculty offices are located nearby in Johnson Hall. This former dormitory provides single and double offices for faculty which include customary desks, shelves, phones, Ethernet, and often a work table. Faculty are provided computers by the institution – typically laptops. Combination printer/scanner/copiers are provided on each floor.

2. *Classrooms and associated equipment that are typically available where the program courses are taught.*

   Most classrooms used by the programs are located in the Swan Building as indicated above. These classrooms are shared among programs housed in the Swan Building. A summary appears below:

Table 8-1. Summary of Classrooms Used by MET

Room	Size sq ft	Capacity	Whiteboard	Projector/ Screen	Computer	Document Camera
Swan 104	881	30	Y	Y	instructor	Y
Swan 105A	1500	30	Y	Y	30 + instructor	Y
Swan 220	1093	39	Y	Y	instructor	Y
Swan 301B	830	36	Y	Y	instructor	Y
Swan 304	1636	64	Y	Y	instructor	Y
Swan 404	1069	48	Y	Y	instructor	Y
NEC 203	1550	70	Y	Y	Instructor	Y

3. *Laboratory facilities including those containing computers (describe available hardware and software) and the associated tools and equipment that support instruction. Include those facilities used by students in the program even if they are not dedicated to the program and*

state the times they are available to students. Complete Appendix C containing a listing of the major pieces of equipment used by the program in support of instruction.

The traditional MET program laboratories occupy two adjoining rooms on the third floor of the five-story Swan Technical Arts Building. More recently Swan 221, originally assigned to the Energy Systems Engineering program, has been used by the MET program for classes and projects. Swan 222 was assigned to the program for one semester, Spring 2015. Swan 219, the Multidisciplinary Project Room, is also assigned to the program.

The computer lab assigned to the department is located on the first floor, Swan 105A (listed in table above).

The Mechanical Engineering Technology (MET) Laboratory Areas with the Courses and Projects that They Support, Based on Room Assignments for 2014-15

MECHANICAL MEASUREMENTS LABORATORY
Room 302 Swan Building 2014-15*

24.6 ft x 30 ft = 738 sq ft

Capacity = 16 students

MECH 332 Mechanical Measurements/Mechatronics
2 hours lecture, 3 hour lab, 3 credits
Offered each Spring Semester, primarily for MET students
Spring 2015: 1 lecture section and 4 lab sections

MECH 341 Lab for Statics and Strengths of Materials
0 hours lecture, 2 hour lab, 1 credit
Offered in the Fall for MET majors.
Fall 2014: 4 sections

MECH 421 MET Senior Lab
3 hours lecture, 3 hour lab, 4 credits
Uses this space in Fall as well as Swan 303.
Fall 2014: 1 lecture section, 3 lab sections

MECH 499 MET Senior Project.
2 hours lecture, 3 hour lab, 3 credits.
Spring semester. Swan 302, along with rooms 221 and 303, are used by many MET seniors for planning and testing senior projects.

Access is generally open to students when classes are not in session.

*See note below for Spring 2015.

FLUID MECHANICS AND FLUID POWER LABORATORY –
Room 303 Swan Building* Fall 2014 and Fall 2015

42.5 ft x 30 ft = 1275 sq ft

Capacity = 12/16 students

MECH 211 Fluid Mechanics (12 student limit due to equipment)
3 hours lecture, 3 hour lab, 4 credits
Offered each Fall Semester, primarily for MET students
Fall 2014: 2 lecture sections, 4 lab sections

MECH 250 Fluid Power with Controls (16 student's maximum)
1 hour lecture, 2 hour lab, 2 credits
Fall, typically 1 lecture, 2 lab sections (Cancelled Fall 2014 due to faculty shortage)
Spring, typically 2 lectures, 4 lab sections. Spring 2015, 2 lectures, 6 lab sections
Offered Fall and Spring, primarily a service course for plastics, welding, electronics students

MECH 499 MET Senior Project.
2 hours lecture, 3 hour lab, 3 credits.
Spring semester. Swan 302, along with rooms 303, 222, and 219, are used by many MET seniors for planning and testing senior projects.

Access is generally open to students when classes are not is session.

*See note below for Spring 2015.

MULTI-DISCIPLINARY PROJECT ROOM - Room 219 Swan Building

50 ft x 31.5 ft = 1575 sq ft
Capacity = 15-20 students

The room is partitioned into three areas.

Assembly: benches, hand tools, hand power tools
Stationary power tools: table saw, mitre say, Smithy™ mill/lathe, band saw, sanders

Materials: hardware, electric, hydraulic, pneumatic controls and components, other materials

Extracurricular multidisciplinary student projects use this space for planning and construction. These projects have included:

Ferris State Rube Goldberg Team
Ferris State Human-Powered Vehicle Team
Ferris State Formula SAE team (v. limited use)
MET homecoming float

MECH 211 Fluid Mechanics wind tunnel models, projects
MECH 332 Mechanical Measurements/Mechatronics projects
MECH 421 MET Senior Lab students use the space for prototype construction for projects.
MECH 499 MET Senior Project
Spring semester. Swan 302, along with rooms 221 and 302 build and test.
PDET 499 Product Design Senior Project. Some use by students for build
EEET 499 Electrical/Electronics Senior Project. Some also use the space for project construction.

Changes since last accreditation visit.

Since the last ETAC of ABET general review in October 2009, one room has been made available to the MET programs. There are two potential building upgrades at the planning stages that may affect the MET programs. These are discussed below.

Swan 221 was designated as the Energy Lab for the recently started Energy Systems Engineering program in Fall 2012. It was originally used for ENGY 420 Energy Generation from Solar & Wind for both lecture and lab with a photovoltaic training system. The following spring and since the space has been used for student projects as well as lab space for MECH 111 MET Seminar.

ENERGY LAB / PROJECT ROOM - Room 221 Swan Building

SIZE: 50 ft x 27.9 ft = 1395 sq ft
Capacity = 30 students

Presently is has power buses in the ceiling, compressed air, and a fume hood remaining from
ventilation hood
9 chemically resistive lab tables and 8 standard tables from other campus facilities.
four large wooden shelves

Extracurricular multidisciplinary student projects use this space for planning and construction. These projects have included:

Ferris State Rube Goldberg Team
Ferris State Human-Powered Vehicle Team
Ferris State Formula SAE team (v. limited use)
MET homecoming float

Classes that use the space include:

MECH 111 MET Seminar – for a team mechatronics experience with VEX kits
MECH 421 MET Senior Lab students use the space for prototype construction for projects.
MECH 499 MET Senior Project, Spring semester. Used for multiple student projects.

Extracurricular multidisciplinary student projects use

Ferris State Formula SAE team, extensive use: measurement of dynamic properties, previous year design review, body, aero construction, storage, staging for outdoor tests

Note on Fall 2014:
MET faculty took advantage of a 40 seat classroom with no classes scheduled for the semester, Swan 311. MECH 341 Lab for Statics and Strengths of Materials was set up in the classroom enabling the instructor to leave equipment set up from one section of lab to the next. There was ample space.

Note on Spring 2015:
For Spring Semester 2015 the MET program was able to use Swan 222 once the Printing Programs had moved out. This change allowed a dedicated room for MECH 250 Fluid Power (Swan 222). Rooms 302/303 was set up as a dedicated space for MECH 332

Mechanical Measurements/Mechatronics. The rooms also served as work space for senior projects.

Other facilities available to students include:

Swan 122 Manufacturing Technology Lab
Manual machining tools including mills, lathes, grinders, saws. CNC machines are available for those with training.

Automotive 112 SAE Room.
Manual and some power tools and welding equipment. Limited to those working on SAE projects.

Swan Annex Proposal October 2012
The 2nd floor of the Swan Annex historically housed FSU's Printing programs. With major drops in enrollment and a move of the programs to the College of Business, the 2nd floor is being repurposed. Much of the space is ideal for engineering labs in that ceilings are high, unfinished concrete floors, power busses plentiful as is compressed air. Storage and water are available in some spaces.

At the request of Dean JK Yates, programs submitted proposals (visions) for a $2-3M investment in the College of Engineering Technology coming from the Provost. MET faculty put together such a proposal. The proposal included equipment review and a look at current and future lab space needs. The proposal fit MET labs essentially into existing Printing lab spaces. The proposal would put all MET labs together, on the same floor. Little remodeling would be needed other than equipment removal and removal of the darkroom labyrinth that remains. The Dean forwarded her recommendations to the Provost in January 2013 with most of what the MET proposal called for in terms of lab space. New equipment proposed was generally not included. The Dean's proposal was not acted upon by Academic Affairs. (Dean Yates soon left the university presumably for reasons not related to this. There was no action from Academic Affairs on her major proposal.)

Current Swan Building Remodeling Projects
There are two projects in the planning stages.

a. Swan Annex Addition/Remodeling
This proposal includes major lab space additions for Ferris State's Manufacturing and Welding programs. Funding would come primarily from a state grant. An architectural firm is managing the planning. Lab space on the first level of the Swan Annex would be approximately doubled for both the Manufacturing and Welding programs. Still under debate is the use of the 2nd floor of the Annex where plans at one stage called for displacing the MET lab and project spaces from the Annex to create multiple lecture room, offices, and more lab for Manufacturing. MET is now part of the decision process and MET needs are being considered.

b. Swan Tower Remodeling
Discussion is also underway regarding remodeling and reallocating space in the Swan Tower. This is the original part of the building constructed in 1965? The same architectural firm is involved.

Summary

Much of the experiments done in MECH courses requires different lab setups from one week to the next. Currently, when more than one course is placed in the same room, MET faculty have to set up/take down more than once per week. During 2014-15 the program was able to make use of empty rooms on a temporary basis – an improvement. Currently lab space for MET classes and activities is spread over several floors resulting in inconveniences in managing equipment, tools, and components as well as with assisting students.

With some exception, the furnishings in MET labs are castoffs from other spaces on campus. Some show their age. This may have impact on recruitment and student success.

Potentially the above mentioned remodeling projects could alleviate these issues.

Recent Major Equipment Additions for the MET Laboratories

Fiscal Year	Description	Quantity	Total
2009	DATAQ GL900 multichannel data logger (Ferris Foundation grant)	1	$ 3,995
2010	USB data acquisition A-D converters National Instruments (Perkins funded)		$ 5,869
2010	PASCO an Introductory Mechanic Lab Kit (Perkins funded)		$ 1,478
2011	National Instruments USB 6353X Series DAQ (Perkins funded)	1	$ 1,799
2011	NI USB 6216 M Series Isolated Screw Terminal (Perkins funded)	3	$ 3,372
2011	Stuska XS-19 Dynamometer (Perkins funded)	1	$ 1,979
2012	Computers (Perkins funded)	9	$ 9,900
2013	H1D Volumetric Hydraulic Bench (Perkins funded)	1	$ 6,406
2013	H11 Centre of Pressure (Perkins funded)	1	$ 1,987
2013	Armfield F1-14 Metacentric Height	1	$ 1,914

2014	Additional Vex Robotics Kits (Perkins Funded)		$ 5,426
2014	H16 Losses in Piping Systems Apparatus H1D (Perkins funded)	1	$ 11,271
2014	H19 Pelton Turbine H1D (Perkins funded)	1	$ 3,844
2014	H215 Reynolds Number and Transitional Flow (Perkins funded)	1	$ 3,253
2014	Armfield F1-12 Hydrostic Pressure (Perkins funded and One-time funded)	1	$ 4,036
2014	Vex Robotics Kits (One-time funds)		$ 15,000
2014	OMEGA Power Supply & Load Cell	1	$ 2,418
2014	Reynolds & Cavitation Demonstration (One-time funds)	2	$ 6,701
2014	SparkFun Inventor's Kits Lab Pack's (One-time funds)	2	$ 2,500
2015	H18 Francis Turbine Requires H1 & H1D (One-time funds)	1	$ 7,830
2015	Quad Output DC Power Supply (One-time funds)	9	$ 3,600
2015	Universal testing machine, small (Perkins funded)	1	$ 39,408

Adequacy of Facilities

Lecture rooms provide ample space. Swan 304 was remodeled in 2008 to include better orientation. A modern instructor station with computer, projector, document camera, and multimedia capabilities was installed. The layout has presented visibility issues for students. This is the first and only instructor station equipped room readily available to MET faculty. More are needed.

MET Program Concern 2 from the 2003 TAC of ABET visit noted the limited lab space for the MET program – and the resulting limit on lab equipment. The concern also noted the spacious labs as provided by nearby programs. The ABET visitor did not see all CET facilities but would have seen more of the same. There has been large sums spent to expand and upgrade labs for other programs. Additionally, a major MET initiated multi-disciplinary project, the Formula SAE car, should be housed in the Swan complex where it is close to the MET labs and equipment, the manufacturing lab, and to MET and manufacturing students and faculty that support the project. Swan 303 becomes cramped for space for senior projects and labs each spring.

A Fanuc industrial robot was donated to the MET program this past year with the help of a freshman student. The MET program has no space large enough to accommodate the unit. Space in other departments has been sought. Current options include exchanging the unit for a smaller one still to be housed in a different department.

Storage remains an issue for the MET program. One of the back rooms in Swan 219 has been designated for storage once the room is cleaned out, remodeled, and rearranged.

Swan 105A Computer Lab was remodeled in 2005. The room has a modern instructor station. Seating orientation was rotated to improve visibility and capacity was increased from 24 to 30. The tight rows are difficult for faculty and students to move through, but the room is basically adequate.

All computers are served by a wired /wireless network which allows adequate access to university file servers and the Internet.

Major Instructional and Laboratory Equipment

All equipment is listed in Appendix C as required by this report.

B. Computing Resources

Ferris State University offers a wide-area high speed network and access to the Internet provided by wired and wireless connections. Wireless networking is provided in many of the outdoor spaces, academic and office locations, including FLITE library. Residence halls and campus apartments have Ethernet and wireless network connections.

Computer labs are located on campus in College of Business, College of Education and Human Services, FLITE library, College of Pharmacy, the Grand Rapids Center, and the West Campus Community Center. Two residence halls on campus have computer labs, available only to residents in those halls. For further information about FSU Wireless networks, please click on: Main Campus Wireless Networks

Student Technology Services provides assistance connecting to the network in residence halls, hardware accessories, software, computer repair services, for personally owned computers (for a fee), manage email services, and printing services in the residence halls and campus apartments. Microsoft Office is available to students, free; as long as they remain students at Ferris. Adobe Acrobat Professional and Creative Cloud, both, for MAC and Windows, sold for a substantial discount at Student Technology Services.

Ferris State University Telecommunications provide campus wireless, internet, intranet, cable television service, traditional, VoIP and Cellular telephone service. Maintain campus video, voice, and data infrastructure. Support specialized instruments for campus clinics. Administer the campus carding system for Dining Services and building security.

Gmail, email, is offered to students on and off campus.

The Ferris Web site (http://www.ferris.edu) provides information about the University and is used to support student Web services. MYFSU, the University portal, links Student, Faculty and Employee Web services to create a customized campus experience.

For detailed information about Technology services to the University, please see the following link

http://www.ferris.edu/techsupport/

C. Guidance

Safety review for each class and facility available to students is discussed in section F. Overall Comments on facilities below. In addition to safety, student receive instruction on the equipment that they will be using at the beginning of each lab session. This is sometimes enhanced with video and other media.

Students receive an overview of computer resources during orientation. Instruction is given prior to use for special applications such as CAD, data acquisition, programming, and operation of computer controlled equipment.

D. Maintenance and Upgrading of Facilities

Equipment, including lab equipment, tools, and computers, are requested through the College's Equipment List described below in Criterion B, Section B.

Lab maintenance for fixed entities – electricity, compressed air, and building maintenance are handled by the Physical Plant division. A digital work order system is used.

Responsibility to maintain lab equipment rests with faculty. They can ask for assistance from technicians assigned to other programs and often supervise student workers. 1-2 faculty have often handled repairs, re-organizing, and equipment repair in labs over the summer.

E. Library Services

A librarian is assigned as liaison to the College of Engineering Technology and provides dedicated collection management and information services. The liaison librarian responds quickly to faculty requests for resources, and works with faculty and with other librarians to make sure that faculty and program needs are met. The liaison librarian is also available to provide information literacy and bibliographic instruction.

Students and faculty indicate satisfaction with library services. Faculty are able to obtain resources needed – books and standards - as are students. Assistance with patent searches is available.

Detail follows:

The Ferris Library for Information, Technology and Education (FLITE) opened on March 12, 2001, as a premier research facility integrating modern technology with traditional information resources. Designed for flexibility and versatility, FLITE provides a useful and lively space for learning. The Library houses 195 public computers (including thirteen Macintosh computers) loaded with a variety of software, approximately 1,000 ports to accommodate laptop access and future expansion, wireless connectivity, seating for 1,300 visitors, and 55 individual and group study rooms. Among its customer service oriented attributes, FLITE contains an extended hours study area, a family study room for visitors accompanied by children, and a coffee shop. Students using FLITE have access to laptop computers and multimedia equipment including scanners, CD burners, video-editing software, and digital cameras. An adaptive technologies laboratory facilitates the learning and research of students requiring special accommodations. Four instruction studios can be reserved by faculty or librarians, and several seminar rooms are available to both faculty and students for instruction, meetings, and professional development activities.

FLITE is a Federal Depository Library for U.S. Government Documents and a Patent and Trademark Depository Library. The Government Documents and Patents Librarian is available for classroom instruction and individual consultations. FLITE provides access to a vast array of electronic resources through subscription journals and databases, the Michigan Electronic Library, and scholarly portals and repositories. SmartSearch, a state-of-the-art Discovery Tool, gives library users the opportunity to search almost all of these resources with a single click. FLITE also provides interlibrary loan and document delivery services as required, at no cost to students and faculty. FLITE librarians provide reference services at the Oval Information Desk and can be contacted by online chat, telephone, email, and text.

F. Overall Comments on Facilities

Safety is a major concern where potential for injury is present. MET faculty review safety issues and obtain student feedback and acknowledgement for each lab course. Feedback is typically in the form of a quiz. Acknowledgement is typically a signed statement. For lab areas where there are power tools MET faculty developed and maintains an on-line training course that is followed by a walk-through. The university has a Risk Management staff which reviews safety issues. Additionally, the university has hired a Director of Lab Safety to review safety procedures in all labs across the campus. The specialist has gone through the MET labs this Spring and is creating a report. Changes are being made in response.

Do in part to recent organizational structures, the MET coordinator office and mailroom are located on the fourth floor of the Swan Building. The room can be difficult for visitors to find and may not always be attended. Labs and classes are typically on other floors resulting in some inefficiencies.

9. CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

An election process is used to select a faculty Academic Program Coordinator for each program in the College. The standard term of office is three years. Release time and summer compensation are summarized in the table below.

Table 9-1. Program Coordinator Release Time and Compensation

Students at Start of Three-Year Term	Academic Year Release Time	Summer Stipend (dollars)	On-Campus Summer Presence Expectations
0 – 49	0.00	0	0 days/week
50 – 99	0.25	4,250	1 day/week
100 – 299	0.50	8,500	2 days/week
300+	0.75	12,750	3 days/week

The MET coordinator receives 50% release time based on the above table. The MET coordinator also serves as the coordinator for the Energy Systems Engineering program without release time or compensation due to the low enrollment in that new program.

The expectations of program coordinators are extensive and detailed in the Position Description for Academic Program Coordinator – College of Engineering Technology. This document is duplicated below.

Position Description for Academic Program Coordinator – College of Engineering Technology, April 19, 2014

I. **SUMMARY OF FUNCTIONS:** The Academic Program Coordinator provides leadership for the program and represents its degrees, faculty, students, and curriculum to internal and external constituencies. Responsible for the overall successful functioning and operation of the program and for following established policies and procedures of Ferris State University (FSU) and the College of Engineering Technology (CET), as well as provisions of the relevant collective bargaining unit. The Academic Program Coordinator works under the supervision and direction of the School Director and the Dean.

II. **CHARACTERISTIC DUTIES:** The Academic Program Coordinator directs activities pertaining to academic effectiveness, efficiency, and where appropriate accreditation of the program. The Academic Program Coordinator also represents the program within the institution and at local, state, and national meetings. The Academic Program Coordinator is responsible for providing leadership that allows the program to attain appropriate educational objectives while promoting the common interests of the program, school, college, and university. Additional duties include the following. Other duties may be assigned.

1. Duties Related to Admissions
    a. Review student transcripts and program admission requirements.
    b. Coordinate student recruitment (travel to high school and community colleges and other activities).
    c. Coordinate tours throughout the academic year and the summer for prospective students and their families.
    d. Monitor the weekly prospective students list and respond accordingly.
    e. Coordinate and attend summer registration.
    f. Contact prospective students and admitted students by letter, email, and phone calls.
    g. Attend and coordinate recruiting events such as Dawg Days, honors invitations, and other special events.

2. Duties Related to Assessment
    a. Coordinate and maintain reporting (TracDat or other vehicles).
    b. Coordinate accreditation activities and on-site visits.
    c. Coordinate Academic Program Review Reports.

3. Duties Related to Budget
    a. Review monthly expenditures and recommend use of program funds.
    b. Coordinate program facilities, equipment, and supplies.
    c. Assist the School Director in the development of the annual budget, projected supplemental faculty needs and equipment list request.

4. Duties Related to Curriculum
    a. Draft class schedules for School Director review and approval.
    b. Coordinate course availability with other programs within the College of Engineering Technology and other colleges.
    c. Responsible for program materials including the catalog, web site, articulation agreements, transfer plans, curriculum check sheets, curriculum changes, and other items.

5. Duties Related to Faculty
    a. Chair program meetings.
    b. Assist tenure-track and adjunct faculty, as required, with course preparation, advising, FSU procedures, professional development, and other items.
    c. Coordinate the selection of tenure-track and adjunct faculty candidates.

d. Coordinate program faculty in Academic Program Review Committee activities.

e. Coordinate faculty selection criteria and credential requirements.

6. Duties Related to Industry

a. Maintain correspondence with industry advisory organization members.

b. Organize industry advisory organization meetings.

c. Create and enhance industry and professional partnerships.

d. Support activities associated with visits by members of organizations external to FSU.

e. Solicit donations (equipment in-kind, scholarships, and monetary donations).

7. Other Duties

a. Coordinate student awards and scholarship selection processes.

b. Coordinate miscellaneous administrative activities such as newsletters, good news, reports, equipment lists, and other items.

III. **RESPONSIBILITIES:** Directly responsible to the School Director and to the College Dean. Responsible for maintaining the confidentiality of designated information. Performs all duties in compliance with applicable University policies and procedures and state and federal requirements.

IV. **SUPERVISORY RESPONSIBILITIES:** Supervisory responsibilities are limited to direction of activities and curriculum as described herein. Direction of such activities and personnel (staff and student workers) is related to program operations. Personnel issues related to human resource activities, review of work performance, and the like are to be referred to the School Director.

V. **REQUIRED QUALIFICATIONS:** To perform this job successfully an individual must be able to perform each essential duty satisfactorily. The Academic Program Coordinator is a tenured College of Engineering Technology faculty member. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions. The term, election, and procedures of appointment are defined in the most recent version of the CET Program Coordinator Election Policy. Related compensation, release time, and expectations of summer presence are defined in the most recent version of the CET Program Coordinator Compensation Schedule.

VI. This description is intended to indicate the kinds of tasks and levels of work difficulty that will be required of this position. It is not intended to limit or in any way to modify the right of any Coordinator to assign, direct, and control the work of employees under his or her supervision. The use of a particular illustration shall not be used to exclude unlisted duties of similar kind or level of difficulty.

The above duties, in addition to more than the nominal 50% teaching, advising, and extracurricular activity can be very demanding on a coordinator's time. Beyond teaching and advising, the current (outgoing) coordinator put priority on the people area of the above list: admissions (potential students), faculty & scheduling, and representing the program at multiple levels. In the past year the current coordinator kept written records of contacts with over 150 potential students generally spending at least an hour with each on their visits. Custom semester-to-semester plans are made for each transfer student that applies and pursues matriculation. Transfer guides have been made for nearly all of the community colleges in the state to assist with advising transfer students. The influx of international students takes additional time beyond domestic students. Lab upkeep and supervision of lab workers has been less than ideal. Assessment tracking has been less than ideal as well. The position is challenging.

B. Program Budget and Financial Support

1. *Describe the process used to establish the program's budget and provide evidence of continuity of institutional support for the program. Include the sources of financial support including both permanent (recurring) and temporary (one-time) funds.*

The supply and expense (S & E) budget for the Mechanical Engineering Technology programs is established by the College of Engineering Technology and the School Director. The College allocates funds to each of the four Schools. School directors, in consultation with program coordinators, allocate S & E funds to each program budget. Directors retain funds for school operations and to supplement S & E funds for programs as needed. The table below shows S & E allocations for the MET programs for the past 6 years.

Table 9-2. Summary of Supply and Expense Income and Expenditures

Fiscal Year	S&E Allocation	Supplemental Allocation	Total Allocation For Expenses	Spent
2010	$ 15,917.00	$ 2,712.96	$ 18,629.96	$ 19,124.52
2011	$ 31,483.00	$ 238.56	$ 31,721.56	$ 20,849.31
2012	$ 29,104.00	$ 2,350.00	$ 31,454.00	$ 36,485.15
2013	$ 27,872.00	$ 4,505.88	$ 32,377.88	$ 38,770.62
2014	$ 26,360.98	$ 1,578.22	$ 27,939.20	$ 27,026.21
2015*	$ 27,872.00	$ 8,245.12	$ 36,117.12	$ 39,999.33

***First 11 months of FY 2015 are shown.**

Carryover of Funds in Accounts
Current university policy allows academic units to carryover unspent balances to the following year. Carryover generally accounts for the differences in income and expenditures in Table 8-1 above.

Equipment Funding
Equipment funding comes from several sources.

a. Perkins funds which available for AAS programs.
b. "One-Time Dollars" coming through the Academic Affairs office to colleges
c. Grants

Schools receive equipment requests from programs and compile them into school equipment lists. School Directors, in consultation with program coordinators, rank the requests. These lists are combined to form a College Equipment List. The Dean, in consultation with School Directors, allocates Perkins and One-Time funds in as equitable manner as possible.

The table below summarizes equipment funds received by the MET programs for the past six years.

Table 9-3. Equipment Funding Summary.

Fiscal Year	Perkins Allocation	One-Time Dollars	Net Income
2010	$ 17,669.31	$ -	$ 17,669.31
2011	$ 7,427.85	$ -	$ 7,427.85
2012	$ 6,300.00	$ -	$ 6,300.00
2013	$ 10,307.00	$ -	$ 10,307.00
2014	$ 55,698.63	$ 24,119.47	$ 79,818.10
2015	$ 39,408.02	$ 11,130.00	$ 50,538.02

Donated equipment in the past six years includes a Fanic robot donated in 2009 along with several hundred components. The robot was not in good repair and was scrapped. A faculty member donated a large table saw to the program in 2010. An environmental chamber was donated in 2013.

2. *Describe how teaching is supported by the institution in terms of graders, teaching assistants, teaching workshops, etc.*

The university does not provide graders or teaching assistants for MET classes. All classes and labs are taught by faculty including grading.

The Faculty Center for Teaching and Learning provides faculty with extensive opportunities to explore new knowledge about teaching and learning, as well as implementing new teaching and assessment methods. This program invites faculty to engage in important discussions, and develop and use innovative and creative teaching content and methods. Information about specific projects and other opportunities for faculty is listed below. The Faculty Center also provided a week long session for new faculty each Fall.

DVDFilesMECH\Faculty Documents\Ferris Faculty Center For Teaching.pdf

http://www.ferris.edu/fctl

3. *To the extent not described above, describe how resources are provided to acquire, maintain, and upgrade the infrastructures, facilities, and equipment used in the program.*

Infrastructure and facilities are maintained by the university's Physical Plant Office. This office is part of the Administration and Finance Division (See Fig. D-12. Administration & Finance Division Organization in Appendix D). Minor repairs are started with an on-line work order system. Major facility upgrades and remodeling takes place through Physical Plant management. Programs bring their needs to the attention of administrators.

Two proposed facility upgrades that may affect MET are described under Criterion 7.

Equipment maintenance comes from each program's S&E budget. Programs may ask for additional funds from their school or the College.

4. *Assess the adequacy of the resources described in this section with respect to the students in the program being able to attain the student outcomes.*

Project space and work space have been troublesome for the MET programs. Student outcomes require "build." "Build" often entails sanding, bonding, painting, welding, and machining - processes that do not work well in ordinary spaces. Suitable space is often not available. Labs provided for other programs are often restricted.

The MET program hopes the current Swan expansion and remodeling projects can have a positive impact on this issue.

C. Staffing

Describe the adequacy of the staff (administrative, instructional, and technical) and institutional services provided to the program. Discuss methods used to retain and train staff.

The MET program is fortunate to have access to three School of Engineering and Computing Technology clerical staff members for academic, financial, and admission support. The academic secretary provides scheduling, curriculum proposal, and correspondence support to programs in the School. The financial secretary handles accounts. Admissions support is provided by a third secretary. The latter two have other assignments including being primary secretary for the school director and maintaining the equipment room for the Surveying Engineering program. Administrative support is excellent.

Administrative support positions are posted to the public. Hiring is generally done with search committees within work rules.

There is no instructional support for MET in the form of teaching assistants or graders. Such might help with the increased enrollments and class sizes.

Technical assistance includes computer support, occasional support from lab technicians assigned to other programs, and part-time student lab assistants. Informational Technology Services (IT) provides a designated technician to oversee computers in each area of campus. The technicians load software, repair and upgrade all computers and related equipment, and resolve network issues. Personal assistance is available 24/7 with a phone call. Provided needs are communicated, support is sound in this area.

There are five lab technicians employed by the College. Each is assigned to one or more programs. These include: Manufacturing and Welding, Plastics and Rubber, HVACR, Electronics/Computer Networks, and Automotive/Heavy Equipment. There is a full time clerk in the Automotive program. These technicians, especially the Manufacturing/Welding technician and Electronics technician to a lesser extent, provide valuable assistance to the MET programs each year. While no records are kept, the Manufacturing/Welding technician probably spends 10-20 hours per year assisting MET often by delegation to the student workers whom he supervisors. While the Electronics Technician position was open the past year, this position has provided several hours of support each year and often helps with minor supplies.

Hiring for technician positions is similar to that for clerical.

Regarding adequacy of support, some additional support could be beneficial to MET faculty as presently the faculty has sole responsibility for maintaining equipment, organization, and cleanliness of lab.

D. Faculty Hiring and Retention

1. Describe the process for hiring of new faculty.

When a faculty position is open school directors form faculty search committees. Human Resources, with consultation with the search committee, posts all open positions on www.ferris.edu. Human Resources advertises all open positions in the Chronicle of Higher Education. Also open positions are advertised in regional newspapers and websites and in appropriate technical society digital 'job boards.' Recent MET open positions have been posted with ASME, SAE, SME, and ASEE. The full institution hiring policy is on the DVD.

DVDFilesMECH\Faculty Documents\HiringProcessGuide.pdf

2. Describe strategies used to retain current qualified faculty.

Prior to the start of their first semester new faculty are given a week of orientation and training by the Faculty Center for Teaching and Learning. New faculty are assigned mentors to provide guidance and assure personal attention during the first year. First year faculty are not given advisees to allow more time for class preparation.

Faculty development support, described in 8.E below is available.

E. Support of Faculty Professional Development

Describe the adequacy of support for faculty professional development, how such activities such as sabbaticals, travel, workshops, seminars, etc., are planned and supported.

The faculty has several opportunities for professional development.

- Each faculty member is responsible for a Professional Development Plan, both pre- and post-tenure. This is reviewed by the Associate Dean of the College with the faculty member.
- The faculty member can apply for College of Engineering Technology Professional Development Grants up to $2000 to $2200.
- The faculty member can apply for a Ferris Foundation Exceptional Merit Grant for development funds. Grants up to $7,500 are available.
- The Faculty Senate awards $30,000 annually for professional development.
- Faculty may receive up to $1050 to $1200 to provide for travel expenses to conferences, etc. from the Timme Travel Grant Fund.

Sabbatical leaves for professional development are available to tenured faculty after 10 semesters of continuous service (exclusive of Summer Semester). Leave of one semester with full salary or two semesters at half salary are available. The selection process, spelled out by contract, involves a faculty sabbatical committee, school directors/department head, and dean within each college. A university-wide faculty sabbatical committee makes recommendations to the Provost who makes final decisions.

The Faculty Center for Teaching and Learning provides faculty with opportunities to explore new knowledge about teaching and learning, as well as implementing new teaching and assessment methods. This program invites faculty to engage in important discussions, and develop and use innovative and creative teaching content and methods. Information about specific projects and other opportunities for faculty is listed below.

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University employees may take up to 8 semester hours of credit from the university each semester at no cost. Occasionally coursework provides professional development. There are no graduate level engineering or engineering technology courses offered however. The university does not reimburse faculty for tuition and expenses for coursework taken at other institutions.

Support for faculty development generally allows each faculty member to take one trip each year. S&E funds and personal funds are sometimes used to cover expenses. This is considered adequate.

Support for such activities as professional meetings generally comes from program S & E account. This would include mileage and nominal meal costs. Such meetings typically occur at least an hour away in cities such as Grand Rapids and Muskegon.

PROGRAM CRITERIA

Describe how the program satisfies any applicable program criteria. If already covered elsewhere in the self-study report, provide appropriate references.

Program criteria for mechanical engineering technology comes from ASME. The required outcomes, from "Criteria for Accrediting Engineering Technology Programs, 2015-16 Accreditation Cycle," Engineering Technology Accreditation Commission, ABET, pp. 22-23, are reproduced below:

> "**Outcomes**
> The mechanical engineering technology discipline encompasses the areas (and principles) of materials, applied mechanics, computer-aided drafting/design, manufacturing, experimental techniques/procedure, analysis of engineering data, machine/mechanical design/analysis, conventional or alternative energy system design/analysis, power generation, fluid power, thermal/fluid system design/analysis, plant operation, maintenance, technical sales, instrumentation/control systems, and heating, ventilation, and air conditioning (HVAC), among others. As such, programs outcomes, based on specific program objectives, may have a narrower focus with greater depth, selecting fewer areas, or a broader spectrum approach with less depth, drawing from multiple areas. However, all programs must demonstrate an applied basis in engineering mechanics/sciences.
>
> Associate degree programs must demonstrate that graduates can apply specific program principles to the specification, installation, fabrication, test, operation, maintenance, sales, or documentation of basic mechanical systems depending on program orientation and the needs of their constituents.
>
> Baccalaureate degree programs must demonstrate that graduates can apply specific program principles to the analysis, design, development, implementation, or oversight of more advanced mechanical systems or processes depending on program orientation and the needs of their constituents."

These are very broad outcomes. The AAS and BS MET are broad, rather foundational programs that are intended to prepare graduates for a great variety of mechanically related careers. Most of the academic areas listed in the first part of the ASME Outcomes statement are included in the curricula. The skills demonstrated by student work should validate the requirements given in the paragraphs directed specifically towards the associate and baccalaureate programs.

APPENDICES

Appendix A. Course Syllabi

1.	Course Title	**ETEC 140 Engineering Graphics Comprehensive**
2.	Credits and Contact Hours	3 credits 2 hour lecture 3 hour lab
3.	Instructor or Course Coordinator	Matt Crosson
4.	Textbook	Technical Drawing 101, Smith and Ramirez, 2nd edition, Prentice Hall, 2011 Engineering Graphics Comprehensive, Brady, 1st Edition, McGraw Hill Create, 2011 (Referred to as the "Appendices Book")
a.	other materials	
5.	Specific Course Information	
a.	catalog description	Comprehensive introductory course which integrating technical drawing fundamentals, 2-D CAD, and 3-D Cad. Drawing fundamentals will focus on understanding and recognizing the standards which guide the creation of technical drawings, reading and interpreting technical drawings, and creating standards compliant sketches. The CAD portion of the course will focus on basic competence in turning sketched ideas into 2-D CAD drawings and basic 3D computer models that meet design intent and are ready for future analysis.
b.	prerequisites or co-requisites	none
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. The student will demonstrate manual sketching skills and create properly dimensioned, multiple view drawings 2. The student will use 2-D CAD to create and modify objects

		3. The student will use parametric CAD to create 3-D parts as well as create drawings and assemblies from these parts
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1, 3 ABET a, b, f, i BSMET 1 ABET a, d, g, k
7.	Brief list of topics covered	

I. Technical drawing fundamentals and sketching
   A. Demonstrate knowledge of how the standards guide technical drawing creation
   B. Match views of an orthographic drawing with appropriate views of a physical model and/or pictorial representation of an object
   C. Create orthographic sketches from physical models and/or pictorial representations of objects
   D. Create isometric and oblique sketches from physical models and/or orthographic drawings
   E. Identify different types of sectional views from technical drawings
   F. Draw a full or half sectional view for a multi-view drawing
   G. Create an auxiliary view of an inclined surface as seen in a multi-view drawing
   H. Apply dimensions to an orthographic sketch
   I. Calculate the tolerance accumulation for a feature shown on a working drawing
   J. Calculate the fit for a shaft/hole combination using standard fit charts
   K. Demonstrate the ability to read and understand threaded fastener notes on working drawings
   L. Read and interpret working drawings

II. Two-dimensional CAD
   A. Open, modify, and save CAD drawing files
   B. Draw basic object geometry from directions or sketches
   C. Modify drawing setting and object properties
   D. Setup drawings for output and viewing
   E. Create dimensioned and tolerance mulitview drawings Crosshatch sectioned details

III. Three-dimensional CAD
   A. Create fully constrained sketches in a 2D sketching environment that are dimensioned to meet design intent
   B. Extrude 3D objects from 2D sketches
   C. Revolve 3D objects from 2D sketches
   D. Add features such as holes, bosses, slots, etc to extruded or revolved objects
   E. Modify part geometry
   F. Create basic assemblies from created parts
   G. Create 2D orthographic drawings from a completed model with dimensions and notes

1.	Course Number and Name	**MET Seminar**
2.	Credits and Contact Hours	1 credit 1 lecture per week
3.	Instructor or Course Coordinator	B. Brady
4.	Textbook	none
a.	other materials	none
5.	Specific Course Information	
a.	catalog description	Careers, courses, program goals, and faculty in the MET program are introduced. Concepts of the technical team, problem solving, ethics, design projects, and an introduction to statistics and engineering economics.
b.	prerequisites or co-requisites	Enrollment in MET.
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Distinguish between engineering, engineering technology and understand goals of MET programs. 2. Apply the creative problem solving model. 3. Relate issues in ethics to the discipline. 4. Demonstrate teamwork principles in a small group project.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1-5 ABET d, e, f, h, i

7.	Brief list of topics covered	1.	Introduction to the MET Program
		2.	Engineering Technology vs. Engineering
		3.	Engineering Design
		4.	Engineering Ethics
		5.	Mechanical Components
		6.	Units
		7.	Fundamental Calculations
		8.	Estimating Measurements and Results

1.	Course Title	**MECH 122 Computer Apps 1 for Technology**
2.	Credits and Contact Hours	2 Credits. 2 Lecture hours per week.
3.	Instructor or Course Coordinator	Brian Brady
4.	Textbook	Pearson Custom Textbook, ISBN 978-1-269-06070-7, Compiled by Brian Brady (first five chapters of Engineering with Excel) *Alternate Textbook:* Engineering with Excel, fourth edition, Ronald W. Larsen, Pearson Prentice Hall, 2013
a.	other materials	USB flash drive or cloud storage account laptop computer
5.	Specific Course Information	
a.	catalog description	Computer lab based course that introduces students to a variety of computer applications used in technology. Students will prove basic proficiency in word processing, spreadsheet creation and graphing, and use of presentation software. Students will also be introduced to basic text-based programming to solve problems involving mathematics.
b.	prerequisites or co-requisites	None
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Demonstrate proficiency in word-processing. 2. Solve problems with electronic spreadsheets. 3. Give an oral presentation enhanced with visual media.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1, 3 ABET a, b, e, i BSMET 5 ABET a, k

7.	Brief list of topics covered	1. Introduction to the course goals, grading and attendance policy 2. Microsoft Windows Explorer and directory structures 3. Microsoft Word 4. Microsoft PowerPoint 5. Microsoft Excel 6. Text-based programming, i.e. MATLAB^{TM} or GNU Octave

1.	Course Title	**MECH 211 Fluid Mechanics**
2.	Credits and Contact Hours	4 Credits Lecture – 3 hours a week. Lab – 3 hours a week.
3.	Instructor or Course Coordinator	Ali Syyed Siahpush
4.	Textbook	Applied Fluid Mechanics *By Mott* , Edition: 7th Publisher: Pearson.
a.	other materials	Calculator
5.	Specific Course Information	
a.	catalog description	Presents principles of fluid flow, flow measurement, low-speed aerodynamics, and gas flow systems. The laboratory activity covers experimental confirmation of the theory as well as hands on demonstration of the operation of pneumatic and hydraulic fluid power components, circuits and control systems.
b.	prerequisites or co-requisites	PHYS 211 or PHYS 241 and MATH 126 or MATH 130 or MATH 220 or a minimum score of 26 on ACT or 560 on SAT.
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Solve fluid flow problems using the general energy equation. 2. Function in teams to complete weekly lab assignments including reports. 3. Function in teams to design a fluid system involving piping and pump(s).
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1. 2. 4 ABET a, b, c, d, e, f, i BSMET 1 ABET a, b, c, d, e, k

7.	Brief list of topics covered	1. Introduction, unit cancellation with multiple systems of measure. 2. Basic Fluid Properties 3. Forces and Moments on Submerged Surfaces 4. Forces and Moments on Submerged Surfaces 5. Buoyancy and Stability 6. Laminar and Turbulent Flows 7. Bernoulli Equation 8. General Energy Equation 9. Energy Losses Due to Friction 10. Minor Losses 11. Series Pipe Systems 12. Parallel Pipe Systems 13. Open Channel Flow 14. Flow Measurement 15. Pump Performance 16. Impact/Momentum and Lift/Drag Forces 17. Fluid Power: Pneumatics, Hydraulics, Fluidics

1.	Course Title	**MECH 212 Kinematics of Mechanisms**
2.	Credits and Contact Hours	2 Credits Lecture 2 hours a week
3.	Instructor or Course Coordinator	Brian Brady
4.	Textbook	Machines and Mechanisms: Applied Kinematic Analysis, David Myszka, 4th Edition, ISBN-13: 978-0-13-215780-3, Prentice Hall, 2012
a.	other materials	Access to 2D CAD software for homework Scientific Calculator
5.	Specific Course Information	
a.	catalog description	Concerned with the study of mechanisms and devices. Position, velocity, and acceleration are determined graphically and analytically. Four-bar linkages, slider cranks, intermittent motion devices, cams, and other mechanisms are covered.
b.	prerequisites or co-requisites	MATH 216 or 220, PHYS 211, 2D CAD Familiarity (AutoCAD, Creo, etc.)
c.	required, elective, selected elective per Table 5-1	Required
6.	Specific goals for course	
a.	specific outcomes	1. Solve mechanism positional problems using graphical (CAD) and mathematical methods. 2. Perform velocity analysis using graphical (CAD) and mathematical methods. 3. Perform acceleration analysis using graphical (CAD) methods. 4. Design simple cam profiles using graphical (CAD/spreadsheet) and mathematical methods.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1 ABET a, b, e, i BSMET 1 ABET a, b, d, e, k

7.	Brief list of topics covered	Understand kinematic definitions Be able to develop skeleton outlines from machine representations Vectors Motion Concepts Understand the concept of relative motion Kinematic Displacements Instantaneous Centers Velocities in Mechanisms Accelerations in Mechanisms Cams

1.	Course Title	**MECH 222 Machine Design**
2.	Credits and Contact Hours	4 credits 4 hour lecture
3.	Instructor or Course Coordinator	Randy Stein
4.	Textbook	Machine Elements in Mechanical Design (5th edition) by Robert Mott. Pearson.
a.	other materials	
5.	Specific Course Information	
a.	catalog description	This course looks at the design considerations for many machine elements used in mechanisms and machines. The student learns general mechanical design philosophies and how to specify the size, load, capacity of and operating constraints of such things as gears, belts, chains, columns, threaded fasteners and joints. Typically Offered Spring Only
b.	prerequisites or co-requisites	C- in MECH 340
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Use Johnson and Euler column buckling analysis as appropriate. 2. Size shafts for rotating machinery. 3. Discuss and select appropriate bearings for applications. 4. Select appropriate belt, chain, and gear drives for rotating machinery.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1 ABET a, b, e, f, i BSMET 1 ABET a, b, d, e, k

7.	Brief list of topics covered	1. Statics and Strength of Materials review 2. Mechanical design procedures 3. Gear/belt/chain drives 4. Column analysis 5. Joint analysis 6. Team design project

1.	Course Title	**MECH 223 Thermodynamics**
2.	Credits and Contact Hours	3 Credits Lecture 3 hours a week
3.	Instructor or Course Coordinator	Ali Syyed Siahpush
4.	Textbook	Thermodynamics and Heat Power, Rolle, 6th edition, Prentice-Hall, 2005.
a.	other materials	
5.	Specific Course Information	
a.	catalog description	Introduce students to classical thermodynamics while developing basic skills in problem solving. Students will gain experience in solving energy system problems from a macroscopic perspective. Fundamental concepts in work, heat, energy, and entropy will be stressed. Problems will include material phases of ideal gases, real gases, liquids, and solids. Students will be expected to apply their knowledge of mathematics, sciences, and modern engineering techniques to solve thermodynamic problems.
b.	prerequisites or co-requisites	MATH 216/220 and PHYS 211/241 Differential and Integral Calculus, Basic Chemistry Basic Physics, Conservation of Energy (from Dynamics), Problem solving techniques.
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	1. Demonstrate understanding of the First Law 2. Demonstrate understanding of fundamental cycles. 3. Function in teams to analyze a system with multiple variables 4. Write and present a study on a topic in thermodynamics.
a.	specific outcomes	
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1 ABET a, b, e, i BSMET 1 ABET a, b, k

7.	Brief list of topics covered	1. Introduction: the course goals, the attendance policy and grading policy 2. Thermodynamic Laws 3. Properties of Liquids and Gases 4. Ideal Gases 5. Mixtures of Ideal Gases 6. Combustion 7. Power Cycles 8. Refrigeration 9. Energy Efficiency

1.	Course Title	**MECH 311 Finite Element Analysis/Solid Modeling**
2.	Credits and Contact Hours	2 Credits 6 Lab hours per week
3.	Instructor or Course Coordinator	Brian Brady
4.	Textbook	<u>Designing with Creo Parametric</u> 2.0, Rider, SDC Publications, 2013 <u>Creo Simulate Tutorial Releases 1.0 and 2.0 (Structure and Thermal</u>), Toogood, SDC Publications, 2012
a.	other materials	Scientific calculator with trig functions • USB flash-drive or cloud storage account
5.	Specific Course Information	
a.	catalog description	An introduction to computer based solid modeling and finite element analysis. To include introduction to element types, boundary conditions, stiffness, heat transfer, significance of results.
b.	prerequisites or co-requisites	ETEC 140 and MECH 340
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. develop an understanding of fundamental concepts in solids modeling. 2. develop an understanding of fundamental concepts in finite element analysis including element types, boundary conditions, analysis types, and solution. 3. demonstrate ability to interpret and verify analysis results. 4. demonstrate software capability to optimize designs.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 1, 5 ABET a, b, d, k

7.	Brief list of topics covered	1. Introduction to course 2. Introduction to the solid modeling interface 3. Review of Theories of Failure and their Applications 4. Beam Elements 5. Plate Elements 6. Boundary Conditions 7. Sensitivity and Optimization Studies 8. Contact Elements and Analysis 9. Applications in Heat Transfer 10. Additional Solid Modeling Concepts 11. Team Projects

1.	Course Title	**MECH 322 Computer Apps 2 for Technology**
2.	Credits and Contact Hours	2 Credits 1 Lecture, 3 Lab Hours per Week
3.	Instructor or Course Coordinator	Brian Brady
4.	Textbook	
a.	other materials	
5.	Specific Course Information	
a.	catalog description	A foundation course in computer programming and applications for MET students. Fundamental concepts including variables, arrays, loops, and Boolean logic. Introduction to programming with a text language and mathematics software. Problem solving applications including statistics and numerical methods.
b.	prerequisites or co-requisites	MECH 122 with a grade of C- or better or ISYS 105, MATH 216 or 220, MECH 340 with a grade of C- or better.
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Fundamental Programming Concepts: Understand fundamental computer programming concepts. 2. Text based programming: Develop text based programs involving loops, logic, arrays, and subprograms. 3. Numerical calculus: Demonstrate understanding of calculus concepts with numerical methods. 4. G-code (graphical) programming: Create simple programs in G-code. (LabVIEW or similar programming.) 5. Math software: Solve complex problems with math software.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 1, 5 ABET a, b, k

7.	Brief list of topics covered	1. Course introduction: Goals, assessment. software introduction 2. Matrix-based software overview, interactive use 3. Arrays and applications 4. Functions and Files 5. Decision Making, Loops 6. Plots and Model Building 7. Statistics with programming 8. Numeric calculus 9. Symbolic math programming 10. Arduino microcontroller programming

1.	Course Title	**MECH 330 Heat Transfer**
2.	Credits and Contact Hours	3 Credits 3 Lecture, 0 Lab Hours per Week
3.	Instructor or Course Coordinator	Ali Syyed Siahpush
4.	Textbook	Heat and Mass Transfer: Fundamentals & Applications Fifth Edition, Yunus A. Cengel, Afshin J. Ghajar
a.	other materials	
5.	Specific Course Information	
a.	catalog description	This course introduces the student to the fundamentals of heat transfer that are commonly found in many processes and products. The physical concepts of conduction, convection, and radiation heat transfer are covered with emphasis on problem solving and practical application. Computer solutions are included.
b.	prerequisites or co-requisites	MATH216 or MATH 220; PHYS 211 or PHYS 241
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Student will be able to use basic heat transfer equations for conduction, convection, radiation. 2. Student will be able to solve steady-state and transient conduction problems. 3. Student will be able to apply empirical results to convection problems. 4. Student will be able to predict heat exchanger performance. 5.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 1 ABET a, b, d, k

7.	Brief list of topics covered	1. Introduction and orientation. Review systems of units 2. Fundamental Concepts 3. One-Dimensional Steady Conduction 4. Extended Surfaces 5. Two-Dimensional Steady Conduction 6. Unsteady Conduction 7. Principles of Convection 8. External Forced Convection 9. Internal Forced Convection 10. Natural Convection 11. Heat Exchangers 12. Thermal Radiation

1.	Course Title	**MECH 332 Mechanical Measurements/Mechatronics**
2.	Credits and Contact Hours	3 credits 2 hour lecture 3 hour lab
3.	Instructor or Course Coordinator	Chuck Drake
4.	Textbook	Theory and Design of Mechanical Measurements, Figliola and Beasley, 5th Ed., Wiley.
a.	other materials	
5.	Specific Course Information	
a.	catalog description	Introduction to methods of instrumentation, collection, and analysis of data. The emphasis will be on methods of measurements of stress, temperature, pressure, force and torque. Signal conditioning, data-acquisition, data reduction, calibration, and report writing are included.
b.	prerequisites or co-requisites	MECH 340(C- minimum) and EEET 201
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Demonstrate understanding of sensor operation, basic circuits, and operational amplifiers. 2. Function in teams to complete weekly lab assignments including reports. 3. Construct and calibrate a transducer or equivalent unique project. 4. Document, present, and evaluate a project.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 1, 4, 5 ABET a, b, c, e, k

7.	Brief list of topics covered	1. Introduction to course 2. Basic Concepts in Measurement Systems 3. Probability and Statistics Review 4. Analog Electrical Devices and Measurements 5. Strain Measurement 6. Mechatronics: Sensors, Actuators, and Controls 7. Temperature Measurement 8. Pressure Measurement 9. Team Projects

1.	Course Title	**MECH 340 Statics and Strength of Materials**
2.	Credits and Contact Hours	4 credits 4 hours lecture
3.	Instructor or Course Coordinator	Randy Stein
4.	Textbook	Statics and Strength of Materials, Morrow & Kokernak 7th edition, Prentice Hall,
a.	other materials	
5.	Specific Course Information	
a.	catalog description	Statics and Strength of Materials is a part of physics known as mechanics. This course studies forces, components, resultants, equilibrium, friction, centroids, and stress/strain relationships. The subject of dynamics will be introduced. The course also covers topics in strength of materials: the concepts of deformation, stress concentrations, factor of safety, torsional stress and deformation, beam stresses, and combined stress.
b.	prerequisites or co-requisites	MATH 126 or MATH 130, PHYS 211 or 241
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Solve concurrent force systems for unknowns 2. Solve non-concurrent force systems for unknowns 3. Construct V-M diagrams for beams 4. Determine stresses associated with axial, bending, shear, and torsional loads, and combination loadings
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1 ABET a, b, e, i BSMET 1 ABET a, b, d, k

7.	Brief list of topics covered	1. Introduction and orientation 2. Vectors, forces and moments 3. Resultant forces and moments 4. Concurrent equilibrium 5. Rigid body equilibrium 6. Friction 7. Centroids 8. Simple stress and strain 9. Stress concentrations and factors of safety 10. Torsion and angle of twist 11. Beam loads, shear and moment diagrams 12. Bending in beams 13. Combined stress 14. Area moment of inertia

1.	Course Title	**MECH 341 Statics and Strengths of Materials Lab**
2.	Credits and Contact Hours	1 Credit 2 Lab hours a week
3.	Instructor or Course Coordinator	Brian D Brady
4.	Textbook	None
a.	other materials	Scientific calculator with trig functions.
5.	Specific Course Information	
a.	catalog description	This laboratory course supports MECH 340, Statics and Strength of Materials. The student will perform hands-on experiments and demonstrations that explore the concepts covered in MECH 340 lectures. Measurement of physical phenomena, resolution of practical design problems, and exploration of computer resources will be included.
b.	prerequisites or co-requisites	MATH 126 or 130 and PHYS 211 or 241 Co-requisite MECH 340.
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Set up, run, and analyze experiments demonstrating the principles of statics. 2. In a small team, design a simple structure demonstrating comprehension of statics and strengths of materials.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	AASMET 1, 2, 3, 4 ABET a, b, c, d, e, f, i BSMET 1 ABET a, b, d, e, k

7.	Brief list of topics covered	1. Introduction and orientation; units 2. Concurrent force systems and equilibrium 3. Moment of a force and equilibrium 4. Trusses 5. Friction 6. Center of gravity and centroids 7. Hooke's Law 8. Normal and shear stress 9. Torsional deflections 10. Beam deflections 11. Design problems/projects

1.	Course Title	**MECH 360 Dynamics**
2.	Credits and Contact Hours	3 Credits 3 Lecture hours per week
3.	Instructor or Course Coordinator	Randy J Stein
4.	Textbook	Conceptual Dynamics by Plantenberg and Hill. SDC Publications. 2013.
a.	other materials	
5.	Specific Course Information	
a.	catalog description	This course looks at the kinematics and kinetics of particle mechanics in two and three dimensions. Forces and accelerations. Planar kinematics and kinetics of rigid bodies. Applications of the principles of Newton's three laws (basic physics), work and energy, and impulse and momentum.
b.	prerequisites or co-requisites	MECH 340 with a grade of C- or better MATH 216 or 220
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Demonstrate ability to use calculus to solve particle kinematics problems 2. Solve 3-4 particle dynamics problems 3. Apply principles of work and energy, impulse and momentum, and impact 4. Solve 2-D rigid body kinetics problems
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 1 ABET a, b, d, k

7.	Brief list of topics covered	1. Introduction 2. Kinematics of particles 3. Kinetics of a particle 4. Kinetics of particles: work and energy 5. Kinetics of particles: impulse and momentum 6. Planar kinematics of a rigid body 7. Planar kinetics of a rigid body: force and acceleration 8. Planar kinetics of a rigid body: work and energy 9. Planar kinetics of a rigid body: impulse and momentum

1.	Course Title	**MECH 393 Industrial Internship**
2.	Credits and Contact Hours	4 Credits 400 hours practicum (10 weeks at 40 hr/week)
3.	Instructor or Course Coordinator	Brian Brady
4.	Textbook	None
a.	other materials	
5.	Specific Course Information	
a.	catalog description	This course places the student in an industrial setting to face the realities of the working world, after completing their junior year. The unique experience that the student will receive is a combined effort to the training site, university, and student. Students will be involved in the industrial projects and daily activities of their employer. Typically Offered Summer Only
b.	prerequisites or co-requisites	Pre-Requisites: Senior Status and Mechanical Engineering Technology students only.
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. The student will demonstrate technical growth during the internship. 2. The student will demonstrate increased productivity during internship. 3. The student will meet the employer's expectations for an intern. 4. The student will demonstrate Knowledge and performance relative to tasks. 5.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 3, 4, 9 ABET a, b, d, k

7.	Brief list of topics covered	See below.

1. Completion of a minimum of 400 hours of work for his/her employer over a ten week period.
2. Submit a weekly report of his/her activities to the intern coordinator.
3. The intern shall attend a one day student/faculty/training supervisor meeting which will be held once during the term.
4. Documents include: resume, letter of employment, contact list, weekly reports, two supervisor evaluations, student experience survey, slide presentation on experience

1.	Course Title	**MECH 421 Senior Lab**
2.	Credits and Contact Hours	4 credits 3 hour lecture 3 hour lab per week
3.	Instructor or Course Coordinator	Chuck Drake
4.	Textbook	Theory and Design for Mechanical Measurements, 5th ed Figliola and Beasley, Wiley, Introduction to Data Acquisition with LabVIEW™, Robert King, McGraw-Hill
a.	other materials	
5.	Specific Course Information	
a.	catalog description	
b.	prerequisites or co-requisites	C- in MECH 332 and permission
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Demonstrate understanding of sensor, signal conditioning, and statistics basics. 2. Use Fourier transforms to analyze time-domain data. 3. Write programs with LabVIEW™ for data acquisition and analysis. 4. Complete a team project involving programming, data acquisition, analysis, report.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 1, 3, 4, 5 ABET a, b, c, d, e, k

7. Brief list of topics covered

	TOPICS	Lect.	Lab Hr
I.	Introduction And Orientation	1	0
II.	Review of Measurements Process Describe direct, indirect, input types, standards, and calibration.	2	0
III.	Standards and Units of Measure Work with the two basic unit systems. Differentiate between units and dimensions.	3	0
IV.	Errors and Statistical Analysis Use statistics including spreadsheets to analyze data variance. Use computer tools to do regression in multiple forms.	5	0
V.	Time-Dependent Characteristics Mathematically solve simple harmonic relationships. Describe and interpret frequency spectrum diagrams. Use computerized FFT to determine frequencies present in time varying signals.	3	0
VI.	System Response Describe the effects of damping. Analyze basic first order filters.	3	0
VII.	Sensors Verify basic operation of multiple sensor types such RTDs, thermistors, LVDT, thermocouples, and strain-gage based sensors.	3	3
VIII.	Signal Conditioning Set up signal-conditioning for multiple sensor types.	2	6
IX.	LabVIEW™ – Commercial Data Acquisition and Control Software Write programs involving loops, arrays, data acquisition and analysis to include statistics and FFT.	8	12
X.	Temperature and Humidity Measurement Describe and use common temperature and humidity sensors.	2	6
XI.	Digital Techniques Set up LabVIEW™ (or other commercial software) to use Booleans to operate relays, motors, etc.	2	3
XII.	Motion Measurement Use accelerometers for at least one lab. Reduce data.	2	6
XIII.	Design Problems/Projects/Presentations Conduct a team project utilizing material from MECH 421.	3	9
XIV.	Exams And Evaluation	3	0
	TOTALS	45	45

1.	Course Title	**MECH 440 Noise and Vibrations**
2.	Credits and Contact Hours	3 credits 3 hour lecture
3.	Instructor or Course Coordinator	Randy Stein
4.	Textbook	none
a.	other materials	instructor notes.
5.	Specific Course Information	
a.	catalog description	This course introduces the student to the fundamental concepts of noise and vibration that are encountered daily in our environment and many manufacturing processes. The physical concepts of the generation, transmission, and reception of sound waves are covered, as well as the nature of mechanical vibrations. The practical applications of noise and vibration are emphasized with problem solving and computer solutions.
b.	prerequisites or co-requisites	C- in MECH 360
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	1. Demonstrate understanding of sensor, signal conditioning, and statistics basics. 2. Use Fourier transforms to analyze time-domain data. 3. Write programs with LabVIEW™ for data acquisition and analysis. 4. Complete a team project involving programming, data acquisition, analysis, report.
b.	student outcomes from Criterion 3 or other outcomes addressed by course	BSMET 1, 3, 4, 5 ABET a, b, c, d, e, k

7. Brief list of topics covered

Topic	**Lect**
I. Introduction and Orientation	1
II. Vibration Fundamentals	2
III. Free Vibration	4
IV. Forced Vibration	4
V. Two Degrees of Freedom	3
VI. Vibration of Strings	3
VII. Vibration of Bars	3
VIII. Nature of Sound	2
IX. Effects of Noise on People	3
X. Types of Sound Fields	4
XI. Acoustics of Rooms and Enclosures	
XII. Acoustic Materials	3
XIII Principles of Noise Control	3
XIV. Case Studies of Noise Control	4
XV. Exams and Evaluation	3
TOTALS	45

1.	Course Number and Name	**MECH 499 MET Senior Project**
2.	Credits and Contact Hours	3 credits. Lecture – 2 Hours/Week Laboratory – 3 Hours/Week
3.	Instructor or Course Coordinator	C. Drake
4.	Textbook	none
a.	other materials	laptop computer memory device $100 likely in material expenses
5.	Specific Course Information	
a.	catalog description	As a capstone, the course includes a demonstration of the ability to solve complex technical problems, ability to communicate both orally and in writing, and understanding of ethical, diversity, and globalization issues. Projects will utilize prior MET coursework in a project that involves design, analysis, and testing. Permission of instructor required.
b.	prerequisites or co-requisites	MECH 421, Senior standing in MET
c.	required, elective, selected elective per Table 5-1	required
6.	Specific goals for course	
a.	specific outcomes	See item 7
b.	student outcomes from Criterion 3 or other outcomes addressed by course	ABET a-d, f-k BSMET 1, 2, 3, 5
7.	Brief list of topics covered	See below.

UNITS OF INSTRUCTION AND PLANNED TIME ALLOCATION:

		Lecture Hours	Lab Hours
I.	Introduction to course and project Review objectives and outcomes for BSMET	1	0
II.	Definition of Project Scope capstone for major use of coursework expectations communications expectations ethics, diversity, and globalization presentations	3	0
III.	Project Proposal Write a proposal for a capstone project.	3	0
IV.	Progress Develop a Gant chart Submit acceptable bi-weekly progress reports	4	3
V.	Design Incorporate prior coursework into a well documented design.	4	9
VI.	Project Technical Review Present technical issues and solutions to faculty	1	6
VIII.	Prototype Construction Construct a working prototype of design	1	9
IX.	Prototype Testing Plan and run suitable tests on prototype – preferably with computer data acquisition.	1	9
X.	Ethics Demonstrate understanding of ethical issues in the engineering profession. MET 6ABET i	1	0
XI.	Globalization and Diversity Demonstrate understanding of the affects of current global issues in manufacturing and technology. Appreciate the benefits of diversity. MET 7 ABET j	2	0
XII.	Furthering Education Demonstration recognition of options to further education. MET 9 ABET h	1	
XIII.	Formal Presentation Make a formal presentation to faculty and underclassmen.	3	3
XIV.	Formal Written Report Submit a formal written report that documents the project and shows excellent writing skills.	5	6
	Sub-Totals	30	45

Appendix B. Faculty Vitae

	Name	**Brian D. Brady**
2.	*Education*	M.S. Mechanical Engineering, U. Illinois, 1991 B. S. Mechanical Engineering, GMI (Kettering University), 1990
3.	*Academic Experience –*	Ferris State University, Mechanical Engineering Technology, full-time ·Associate Professor, August 2012-present ·Assistant Professor, August 2006-July 2012
4.	*Non-Academic Experience*	Merritech Saginaw, Michigan Project Manager / Proposal Engineer, 1997–2006, full time Delphi Chassis Systems Saginaw, Michigan Manufacturing Engineer / Senior Manufacturing Engineer, 1992-1997, full time University of Illinois Urbana, Illinois Research Assistant, 1990-1991, part time Delphi Chassis Systems Saginaw, Michigan Engineering Co-op / Associate Manufacturing Engineer,1985-1990, full time
5.	*Certifications or Professional Registrations*	Siemens Mechatronics Level 1 Instructor Certification
6.	*Professional Organizations*	American Society of Mechanical Engineering American Society of Engineering Educators
7.	*Honors and Awards*	Phi Eta Sigma (Freshman Honor Society) Tau Beta Pi (Engineering Honor Society) Pi Tau Sigma (M. E. Honor Society).
8.	*Service Activities*	· MET Faculty Search Committee, Fall 2014 – Spring 2015 · MET Tenure Committee for Ali Siahpush, Fall 2013 – Spring 2015 · MET Faculty Search Committee, Spring 2013 · CET Promotion Committee, Fall 2013 – Spring 2015 (Chair Fall 2014 – Spring 2015) · ASME HPVC Event Site Committee Chair, Fall 2012 – Spring 2013

Name **Brian D. Brady**

- School Director Search Committee, Spring 2010
- Michigan Energy Conference Student Poster Competition Co-coordinator, Fall 2010 – Spring 2012
- Michigan Energy Conference Steering Committee, Fall 2010 – Spring 2012
- Athletic Advisory Committee, Fall 2010 – Spring 2012
- CET Dean's Advisory Committee, Spring 2011 – Spring 2012
- School Curriculum Committee, Fall 2009 – Spring 2011
- Library Dean Search Committee, Spring 2009
- Library, Historical, and Archive Committee, Fall 2007 – Spring 2010 (Chair Fall 2008 – Spring 2010)
- College of Engineering Technology welcome back picnic
- Advisor to student ASME chapter 2008 – present
- Advisor to Ferris' ASME Human Powered Vehicle Challenge team, 2008 – present
- Reviewer for Second Edition of Engineering Design Graphics (Wiley) by James Leake – 2011
- CET Commencement Adjutant, May 2011, 2012, 2013

9. Publications and Presentations from the Past Five Years

10. Professional Development Activities

- Siemens Mechatronics Level 1 Instructor Training, June 2012
- BlackBoard Calculated Questions Ad-Hoc Group, Fall 2011 – Spring 2012
- FCTL Fireside Chats and Drop-in Sessions, Various Dates
- FerrisConnect BlackBoard Learn Training and Early Adopter, June 2011
- Jossey-Bass Online Teaching and Learning (OTL) Online Conference, October 2009
- FerrisConnect Training, May 2008
- FCTL; 50 Ways to Assess Student Learning, May 2007
- FCTL; Learner Centered Teaching, May 2007

	Name	**Mattew Crosson**
2.	*Education*	Masters in Business Administration, Ferris State University, 2005 Bachelors in Applied Science in Product Design Engineering Technology, Ferris State University, 1999 Associates in Applied Science in Mechanical Engineering Technology, Ferris State University, 1997
3.	*Academic Experience –*	Ferris State University, Adjunct Instructor, 2013 – 2015, Part Time ITT Technical Institute, Adjunct Instructor, 2006 – 2007, Part Time
4.	*Non-Academic Experience*	Haworth, Inc, Project Engineer development of new product, maintenance of business, special order fulfillment, customer contact, cost savings projects, 2007 – current, full time. Nucraft Furniture Company, Senior Product Engineer development of new product, maintenance of business, special order fulfillment, customer contact, cost savings projects, 1998 – 2007, full time.
5.	*Certifications or Professional Registrations*	Advanced Studies Certificate in Quality Management, Ferris State University, 2005
6.	*Professional Organizations*	
7.	*Honors and Awards*	
8.	*Service Activities*	
9.	*Publications and Presentations from the Past Five Years*	
10.	*Professional Development Activities*	Haworth Leadership Institute – Management Development Program, 2012

	Name	**Charles G. Drake**
2.	*Education*	B.S. Mathematics, Lake Superior State College, 1974 M.S. Mechanical Engineering, Michigan Technological University, 1992
3.	*Academic Experience –*	Faculty, Mechanical Engineering Technology, Ferris State 9/2/1990 to present, full time. · Program Coordinator, MET & Energy Systems Engineering, August 2012-August 2015, 50% release time 2014-15, 42% release time previous two years. · Department Chair, 2000-2003, Mechanical Design Department (4 programs) 75% release time. · Professor, 2002 · Associate Professor, 1997 · Assistant Professor, 1992 · Technical Instructor, 1990 Graduate Teaching Assistant 1974-1977 Michigan Technological University, Houghton, Michigan
4.	*Non-Academic Experience*	Reynolds Metals Company Product Development Laboratory Richmond, Virginia ·Test Engineer, 1985-1989, Engineering Test Section ·Design Engineer, 1977-1985, Engineering Dept.
5.	*Certifications or Professional Registrations*	Registered Professional Engineer, ·State of Michigan ·Commonwealth of Virginia
6.	*Professional Organizations*	American Society of Mechanical Engineers American Society of Engineering Education Great Lakes Renewable Energy Assoc. American Solar Energy Association Society of Automotive Engineers
7.	*Honors and Awards*	· Northern Lights "Achievement in Training and Education" recognition, 2014 · International Service Award, FSU International Office, 2012 · Michigan Society of Professional Engineers and Western Chapter Educator of the Year, 2011 · Pi Tau Sigma, M. E. Honorary, Michigan Technological University, 1975

	Name	**Charles G. Drake**
		· Graduated with High Honors, Alpha Chi (General) Honorary, Lake Superior State College, 1974
8.	*Service Activities*	Institution · Academic Senate representing College of Engineering Technology, 15 years including the past 6 years · Academic Policy and Standards Committee, 2008-12 · University Student Life Committee, 2014-present · FSU Spaghetti Bridge Competition, judge, technology support, 2000 to present · College Curriculum Committee · College Recruiting Committee · Advisor: Formula SAE, Mechanical Engineering Technology Association, Club Soccer Professional · ASME Committee on Engineering Technology Accreditation, June 2011-June 2017 · ASME Mechanical Engineering Technology Leadership Committee, Nov 2010-present, Chair, 2012-2014 · ETAC of ABET, Observer, 2005, Evaluator 2006-11, Commissioner/Team Chair, 2013-present Community · MathCounts Coordinator, 2000 to present · Volunteer and Committee member, Family Engineering Night, 2013-present · Youth Soccer Referee Assignor and Referee
9.	*Publications and Presentations from the Past Five Years*	"A Low Cost Lab Project Course to Enhance Learning in a Statics and Strengths of Materials Course," ASEE Annual Conference, June 2011
10.	*Professional Development Activities*	· ETAC of ABET Evaluator, Commissioner, and Team Chair Training · ASEE Annual Conferences, 2010-2015 · ASME M. E. Educational Leadership Summit, March 2014, partial March 2015 · "Micro-Messaging to Reach and Teach Every Student" Workshop, Friday afternoon, March 20, 2015

	Name	**Ali Siahpush, PhD**
2.	*Education*	Post-Doctoral: Mechanical Engineering, University of Idaho, Idaho Falls, Idaho. Research Title: "Integral Solutions of Phase Change with Internal Heat Generation" . Doctor of Philosophy: Mechanical Engineering, University of Idaho, Idaho Falls, Idaho. Dissertation title: "Performance Enhancement of Solid/Liquid Phase-Change Thermal Energy Storage Systems Through the Use of a High Conductivity Porous Metal Matrix". Master of Science: Mechanical and Aerospace Engineering, Utah State University, Logan, Utah. Thesis title: "Solar Radiation Trapping in Multi-Layer Insulation Blankets." Bachelor of Science: Mechanical and Aerospace Engineering, and minor in Mathematics and Physics, Utah State University, Logan, Utah.
3.	*Academic Experience –*	Ferris State, Associate Professor in Mechanical Engineering Technology, 2013-present at Ferris State University 2013-Present, full-time Idaho State University and University of Idaho Adjunct Associate Professor, 2007-2013 institution, rank, title (chair, coordinator, etc. if appropriate), when (ex. 1990-1995), full time or part time
4.	*Non-Academic Experience*	Idaho National Laboratory, Lead Mechanical Engineer, research management, DOE funded phase change heat transfer, 1989-2013, full-time: Space Dynamic Laboratory/Globesat, Lead Mechanical/Aerospace Engineer, research in thermal management low earth orbit satellites, 1983-1989, full-time
5.	*Certifications or Professional Registrations*	
6.	*Professional Organizations*	ASME Rocky Mountain NASA Space Grant Consortia (Board of Directors). Idaho NASA Space Grant Consortia (Board of Directors).

	Name	**Ali Siahpush, PhD**
7.	*Honors and Awards*	2004 Energy Management Achievement Award from DOE in recognition of outstanding energy management in DOE facilities.
8.	*Service Activities*	- Assoc. Editor for the Heat Transfer Engineering Journal - Editorial Advisor for Progress in Nuclear Energy Journal - Past Chair of two ASME Committees: (1) ASME K-13 (multi-phase heat transfer), (2) ASME Sustainability in Engineering. - Technical reviewer for the ASME Heat Transfer Journal, ASME Thermal Engineering Journal, Solar Energy Journal, and SPA Journal
9.	*Publications and Presentations from the Past Five Years*	Over 37 publications. Samples are: 1. Esmaiil Ghasemisahebi, Don McEligot, Kevin Nolan, John Crepeau, Ali Siahpush, Ralph Budwig, "Effects of adverse and favorable pressure gradients on entropy generation in a transitional boundary layer region under the influence of freestream turbulence", Intern. Journal of Heat and Mass Transfer, HMT-D-14-00255, 2014. 2. Ali Siahpush, James Obrien, John Crepeau, Piyush Sabharwall, "Scale Analysis and Experimental Results of a Solid/Liquid Phase-Change Thermal Storage System", IMECE2014-39786, ASME 2014 Internat. Mechanical Engineering Congress & Exposition (IMECE 14), November 14-20, 2014, Montreal, Canada. 3. Shrivastava A., Williams B., Siahpush A., Savage B., and Crepeau J., "Numerical and Experimental Investigation of Melting with Internal Heat Generation Within Cylindrical Enclosures," Applied Thermal Engineering 67 (214) 587-596, ATE 5413. 4. Siahpush, A., Crepeau, and Sabharwall P., "Scale/ Analytical Analyses of Freezing And Convective Melting with Internal Heat Generation" ASME 2013 Summer Heat Transfer Conf. Minneapolis, July, 2013. 5. Ali Siahpush, Piyush Sabharwall, "ASME Material Challenges for Advance Reactor Concepts", ASME 2013 Summer Heat Transfer Conference, July 14-19, 2013. 6. John Crepeau, and Ali S. Siahpush, "Solid-liquid Phase Change Driven by Internal Heat Generation", C. R. Mecanique, Journal of SciVerse ScienceDirect, www.sciencedirect.com. 471–476 (340), 2012.
10.	*Professional Development Activities*	ASME IMECH Conference, Montreal, November 2014

	Name	**Randy J. Stein, Professor**
2.	*Education*	B.S. Mechanical Engineering Michigan Technological University, 1974 M.S. Mechanical Engineering Michigan Technological University, 1981 Penn State, Ph.D. study in Graduate Program in Acoustics (1980-1984 abd) Graduate Teaching Assistant: Michigan Technological University (1973-1977) Pennsylvania State University (1980-1984)
3.	*Academic Experience –*	Ferris State University (1998-present) Professor (2014) MET Program Coordinator (incoming 2015)
4.	*Non-Academic Experience*	John Deere Company, Waterloo, IA (1977-1979) Noise, Vibration, Stress Analysis of Agricultural Tractors IBM, Endicott, NY (1984-1990) Noise, Vibration, Heat Transfer of mainframe computers Caddtech, Rochester, NY (1997-1998) Sales, Technical Service of CAD (Solid Edge), CAM (Esprit) software
5.	*Certifications or Professional Registrations*	
6.	*Professional Organizations*	ASME (American Society of Mechanical Engineers) ASA (Acoustical Society of America)
7.	*Honors and Awards*	Phi Kappa Phi (National Honor Fraternity) while at Penn State
8.	*Service Activities*	Reviewer for many texts and professional journal papers FSU Athletics: involved with many facets of the FSU Hockey Program Lead scorer for MATHCOUNTS competition Chair, Siahpush tenure committee

	Name	**Randy J. Stein, Professor**
		<u>Committees</u> CET School (ECT) Curriculum Committee (2015-present) CET Scholarship Committee (2002-present) Academic Policy and Standards Committee (2013-2014) Chair, CET Reorganization Committee (2012-2013) Chair, CET Promotion/Merit Committee (2010, 2012 as Chair) University Distinguished Teacher Committee (2010-2011) Academic Program Review Council (2000-2008) CET Diversity Committee (2008) CET Curriculum Committee (2005) FSU Academic Senate (2002-2004) CET Graduate School Committee (2004) Chair, University Professional Development Committee (2000-2003)
9.	*Publications and Presentations from the Past Five Years*	
10.	*Professional Development Activities*	

Appendix C.   Equipment

Major Equipment Summary for MET Labs with Fall 2015 Room Assignments

Item	Lab	Room Fall 2015	Major Equipment Name	qty
	Multidisciplinary Project Rm	Swan 219	hand tools, hand held power tools, stationary power tools, components, fasteners, materials	var
1	Freshmen Proj	Swan 221	VEX kits	22
1	Statics&Strengths/Sen.Projects/ Interdisciplinary Projects	Swan 221	environmental chamber	1
2		Swan 221*	pulley/beam panel	1
3		Swan 221*	Pasco mechanics of materials equipment: stress-strain, trusses, pulleys, more	var
1	Senior Lab/Measurements	Swan 222	brake test stand	1
2		Swan 222	Spaghetti Bridge Stand/Mechanism	2
3		Swan 222	simple beam frame, 24 in. long	1
4		Swan 222	machine vibrations unit	1
5		Swan 222	electric motor dyno - dated	1
6		Swan 222	portable air compressor	1
7		Swan 222	NI Compaq RIO system	1
8		Swan 222	multiple NI USB A-D converters	var
9		Swan 222	multiple NI SSC signal conditioners and connector boxes	var

Item	Lab	Room Fall 2015	Major Equipment Name	qty
10	Senior Lab/Measurements (continuation)	Swan 222	multiple sensors: RTD, thermistor, thermocouple, flow, acceleration, air, velocity	var
11		Swan 222	test frame, 7 ft high	
12		Swan 222	Instron Univ Testing Machine	1
13		Swan 222	computer & printer for Instron	1
14		Swan 222	strain indicators w/ peripherals	
15		Swan 222	strain gages, bonding kits, soldering kits	
16		Swan 222	strain indicators w/ peripherals	
17		Swan 222	strain gages, bonding kits, soldering kits	
18		Swan 222	floor dynamometer, bicycle	
1	Thermal Science/Energy	Swan 302	Stirling engine, student	2
2		Swan 302	Small engine dynamometer	1
3		Swan 302	Heat Exchanger Test Stand, water/air	1
4		Swan 302	Heat Exchanger Test Stand, water/water	1
5		Swan 302	jet engine, student	1
6		Swan 302	jet engine, commercial	1
7		Swan 302	wall section heat transfer test	1
8		Swan 302	water heater	1
9		Swan 302	photovoltaic trainer, part 1	1
10		Swan 302	" " part 2	1

Item	Lab	Room Fall 2015	Major Equipment Name	qty
11	Thermal Science/Energy (continuation)	Swan 302	" " desktop PC	1
12		Swan 302	photovoltaic pump demo 1	2
13		Swan 302	solar breadbox water heater	1
14		Swan 302	solar flat plate collector	1
15		Swan 302	Solar Evacuated Tube Heater	1
1	Fluid Power/Fluid Mechanics	Swan 303	Series-Parallel Pumps	1
2		Swan 303	Single Pump/Var. Freq. Drive	1
3		Swan 303	Wind Tunnel	1
4		Swan 303	Pipe Losses	1
5		Swan 303	Fluid Mech Bench/Tank, mass flow	1
6		Swan 303	Fluid Mech Bench/Tank, vol. flow	1
7		Swan 303	student demos	var
8		Swan 303	hydraulic trainer	1
9		Swan 303	pneumatic trainer	1
10		Swan 303	Festo trainers	3

*Freshmen Project Room and Statics/Strength of Materials Room may change.

Appendix D. Institutional Summary

Programs are requested to provide the following information.

1. The Institution

a. Name and address of the institution
Ferris State University
1201 S. State Street
Big Rapids, MI 49307

b. Name and title of the chief executive officer of the institution
David L. Eisler, DMA
President

Name and title of acting on behalf of the President
for accreditation policies, site visits, etc.:
Paul Blake, PhD
Provost & Vice President for Academic Affairs

c. Name and title of the person submitting the Self-Study Report.
Larry Schult/Ron McKean
Dean/Associate Dean, College of Engineering Technology

Ferris State University
College of Technology
1009 Campus Drive, JOH-200
Big Rapids, MI 49307

d. Name the organizations by which the institution is now accredited, and the dates of the initial and most recent accreditation evaluations.
Higher Learning Commission
Initial accreditation: April 24, 1959
Most recent evaluation: 2011-2012

2. Type of Control

Type of managerial control: Ferris State University is governed by a Board of Trustees which has general supervision of the institution and controls and directs institutional expenditures. Members of the Board serve eight-year, staggered terms as appointed by the Governor with the advice and consent of the State Senate.

The President of the University is appointed by the Board of Trustees as its principal executive officer and serves at its pleasure. The President is an ex-officio member of the Board without the right to vote.

3. Educational Unit

- The Mechanical Engineering Technology programs have a Program Coordinator. The coordinator also serves as Program Coordinator for the Energy Systems Engineering program. Chuck Drake serves as the coordinator at the time of this self-study. Randy Stein will be the coordinator at the beginning Fall Semester 2015.

- The Mechanical Engineering Technology programs are part of the School of Computing and Engineering Technology (formerly School of Computer, Electrical, Energy, Mechanical, and Surveying Systems as shown in Figure D-1.) Faculty and staff report to the School Director. The School Director is Ms. Deborah Dawson.

- The School is part of the College of Engineering Technology. School Directors report to the Dean of Engineering Technology, Mr. Larry Schult.

- The Dean, along with 7 other college deans, reports to the Provost and Vice President of Academic Affairs, Dr. Paul Blake. See Figure D-5.

- The Vice President for Academic Affairs, along with six other vice presidents, reports to the President, Dr. David Eisler. See Figure D-4.

- The President reports to the Board of Trustees. See Figure D-2.

- Board members are appointed by the Governor of the State of Michigan, Governor Richard D. Snyder.

Organizational charts follow.

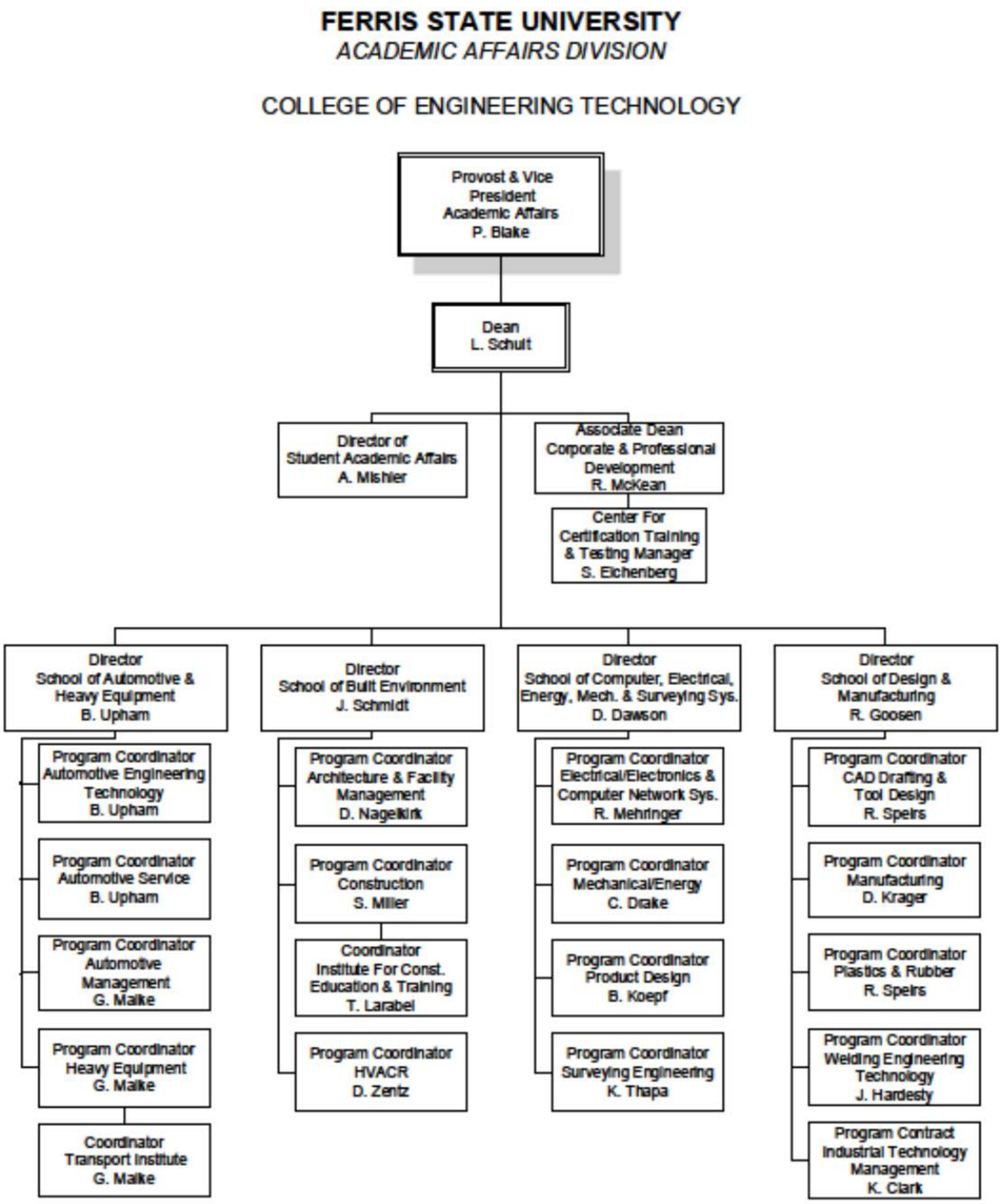

Figure D-1. College of Engineering Technology Organization

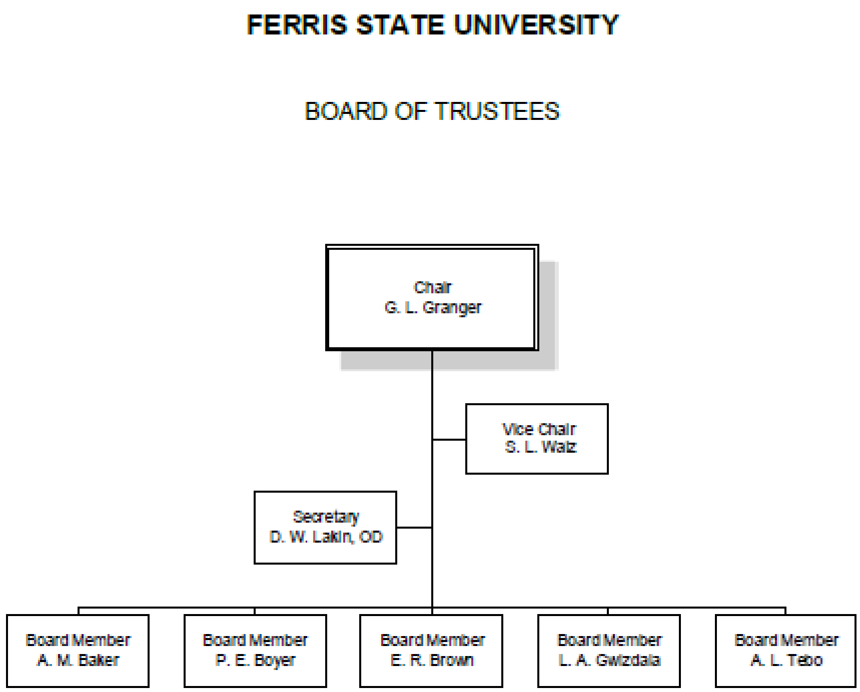

Figure D-2. Board of Trustees Organization

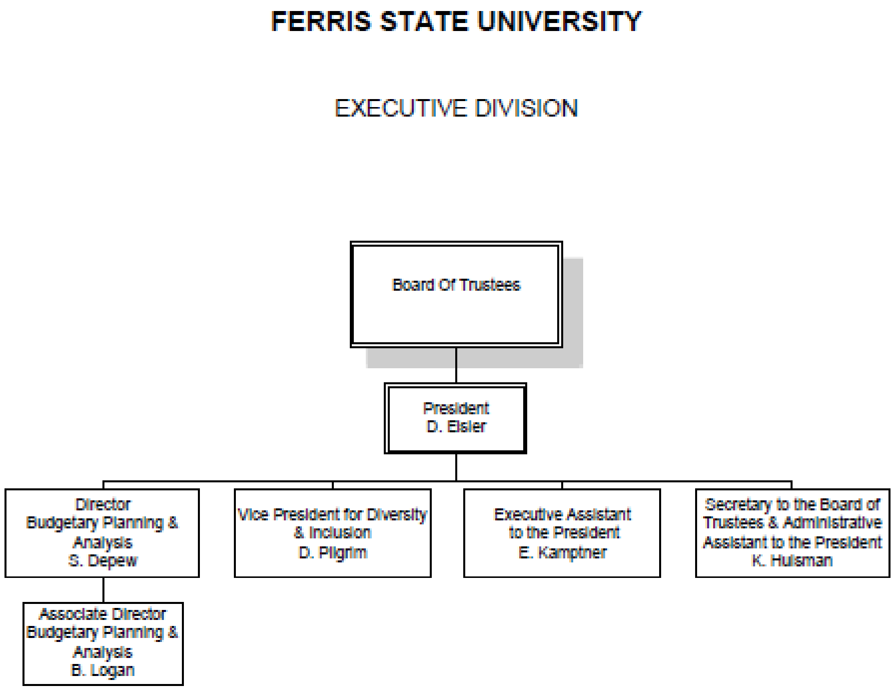

Figure D-3. Executive Division Organization

FERRIS STATE UNIVERSITY

PRESIDENT'S COUNCIL

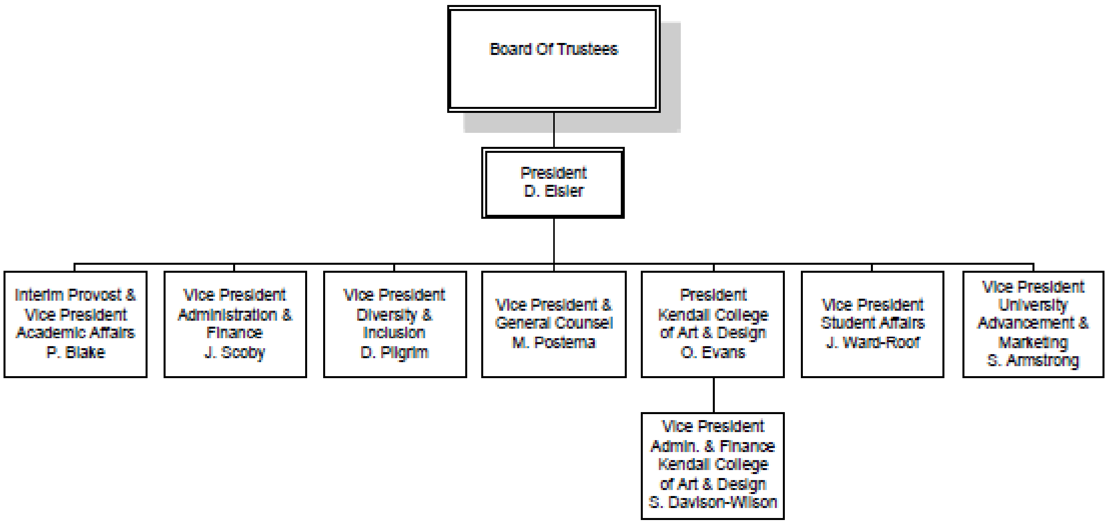

Figure D-4. President's Council

FERRIS STATE UNIVERSITY
ACADEMIC AFFAIRS DIVISION

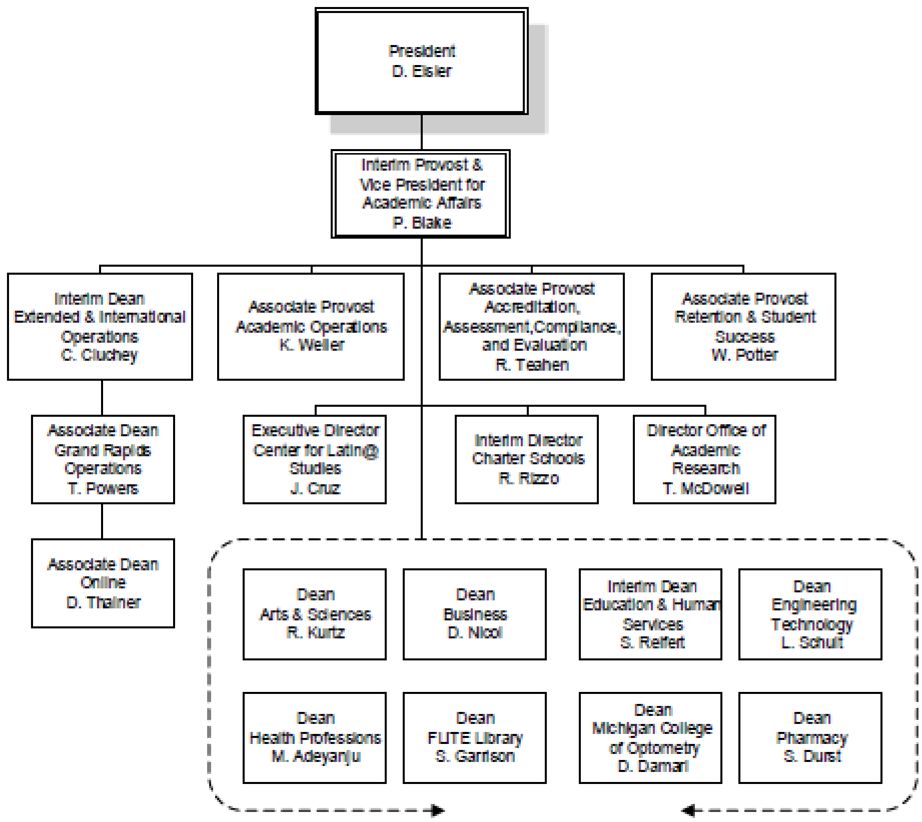

Figure D-5. Academic Affairs Division Organization.

Note that Dr. Paul Blake is now permanent Provost and VP Academic Affairs

FERRIS STATE UNIVERSITY
ACADEMIC AFFAIRS DIVISION

OFFICE OF ACADEMIC AFFAIRS

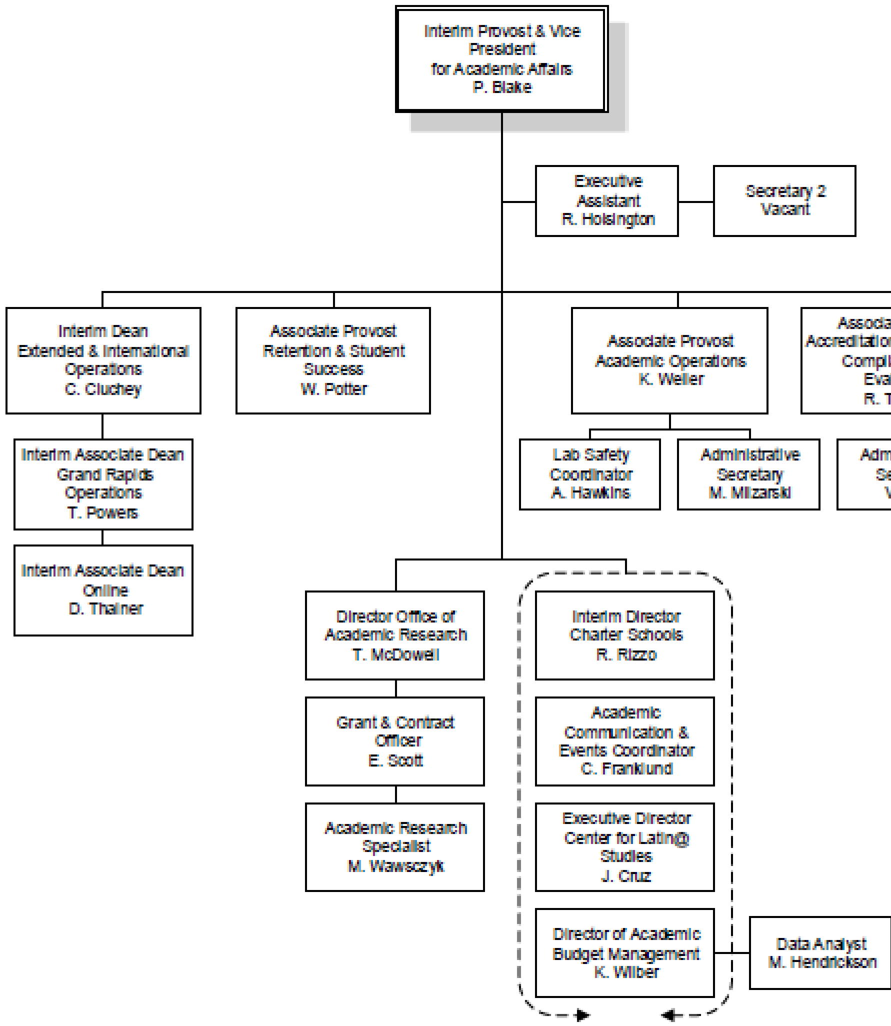

Figure D-6. Office of Academic Affairs Organization

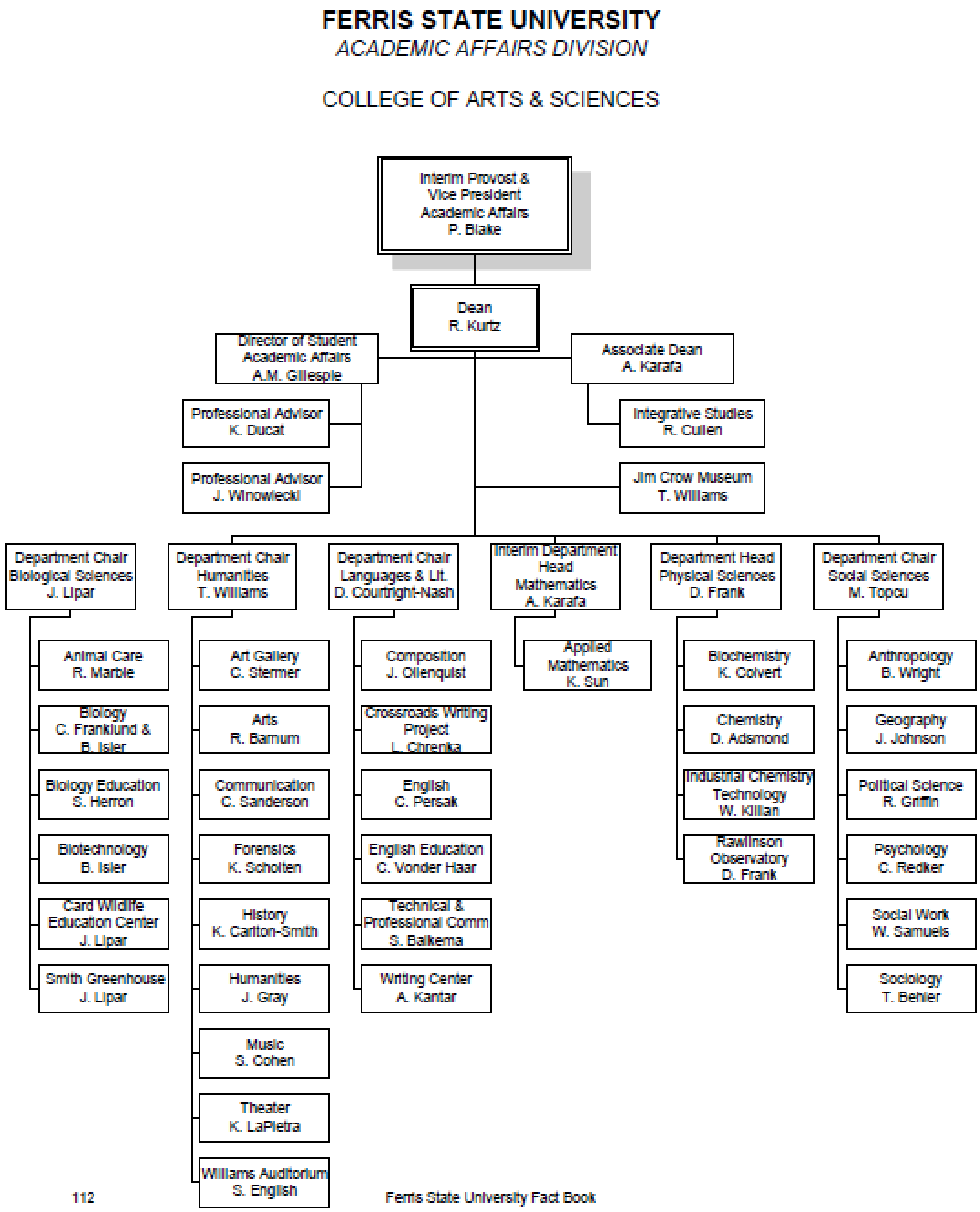

Figure D-7. College of Arts and Sciences Organization

FERRIS STATE UNIVERSITY
ACADEMIC AFFAIRS DIVISION

COLLEGE OF BUSINESS

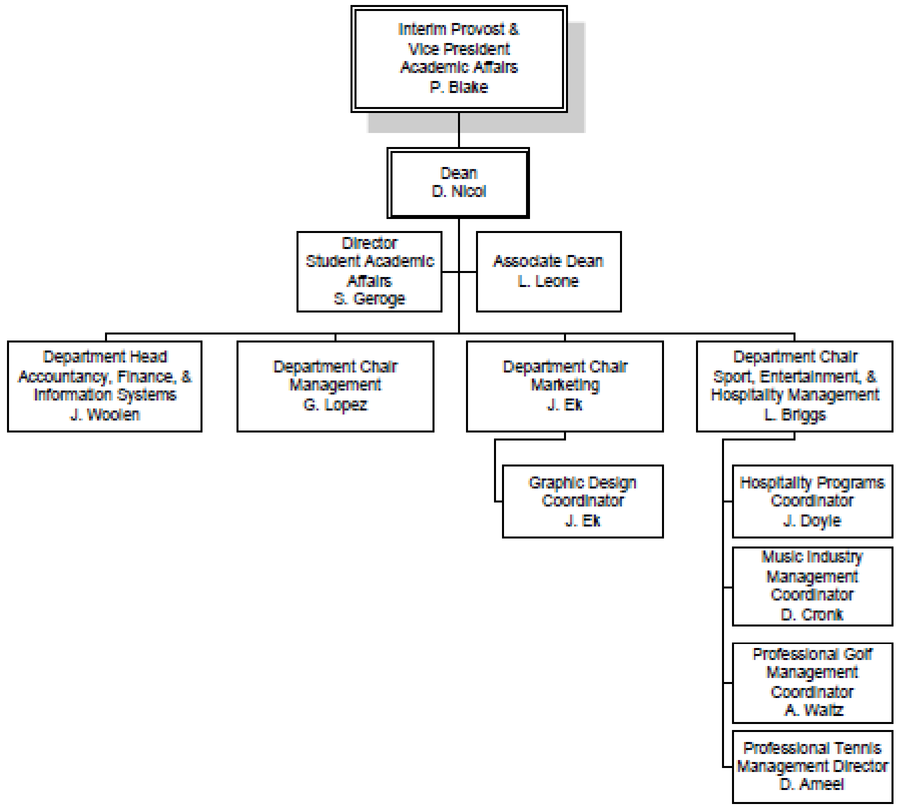

Figure D-8. College of Business Organization

FERRIS STATE UNIVERSITY
ACADEMIC AFFAIRS DIVISION

COLLEGE OF EDUCATION & HUMAN SERVICES

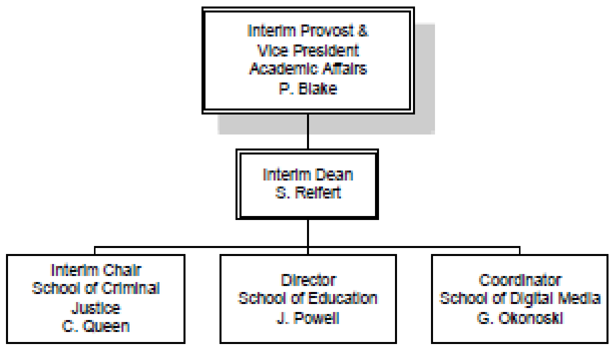

Figure D-9. College of Education & Human Services Organization

FERRIS STATE UNIVERSITY
KENDALL COLLEGE OF ART & DESIGN

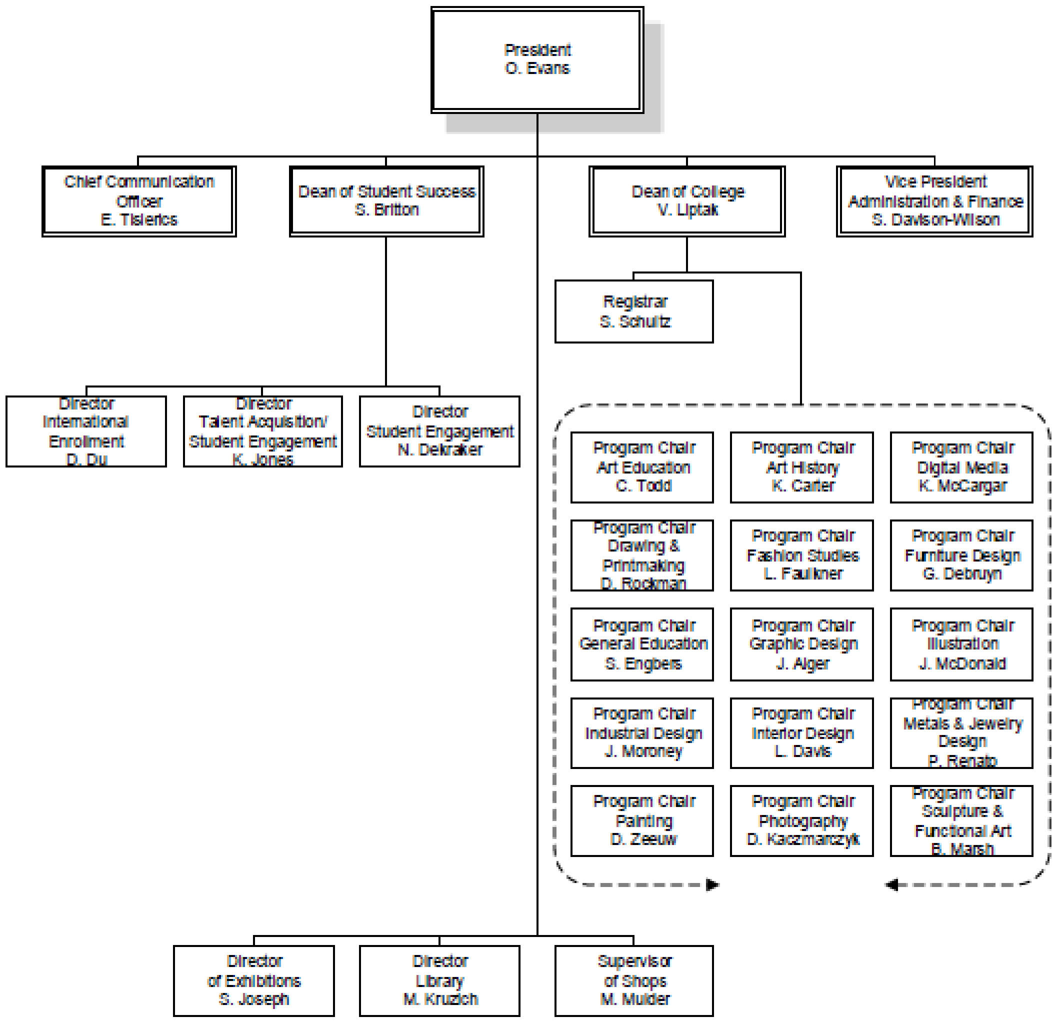

Figure D-10. Kendall College of Art & Design Organization

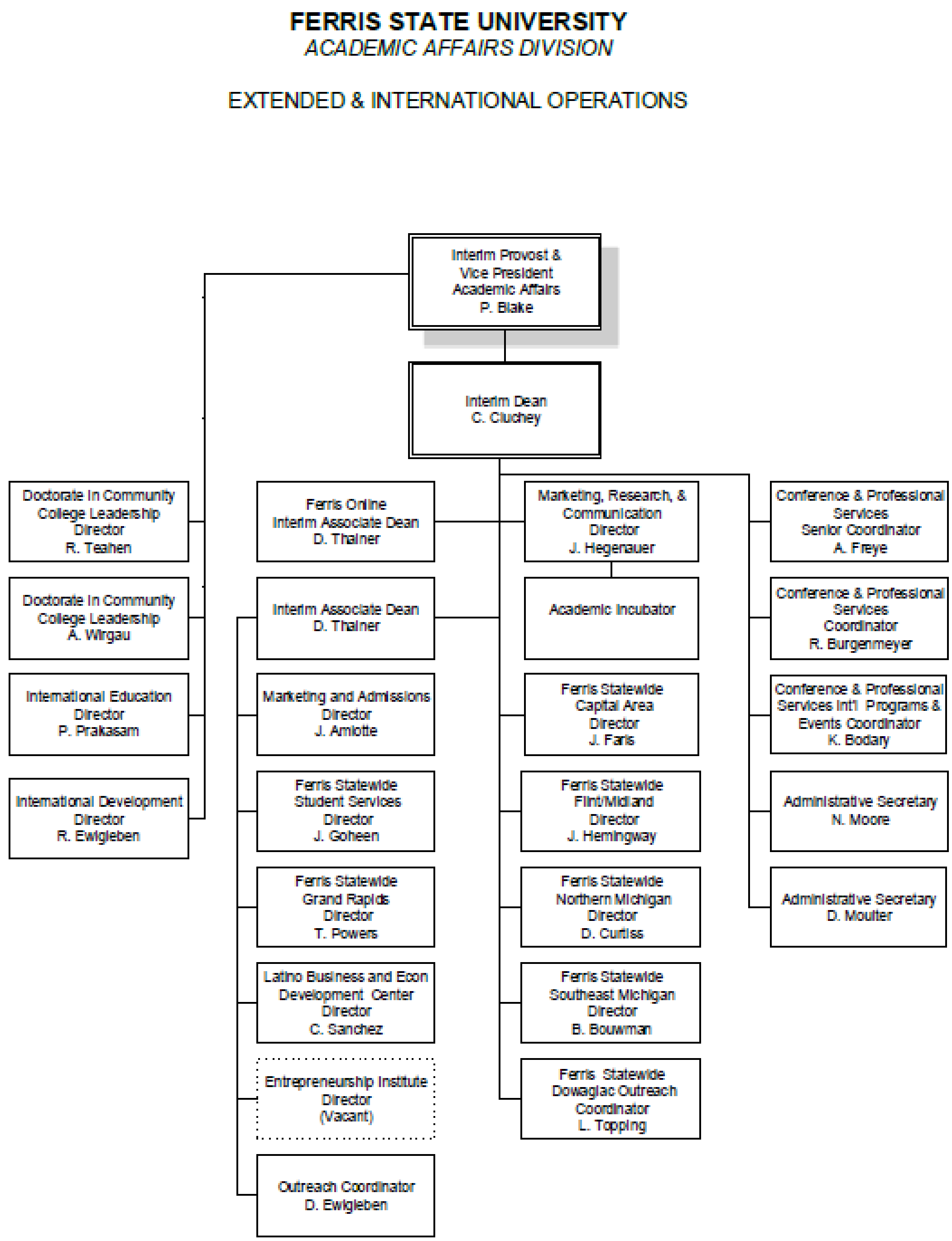

Figure D-11. Extended & International Operations Organization

4. *Academic Support Units*

List the names and titles of the individuals responsible for each of the units that teach courses required by the program being evaluated, e.g., mathematics, physics, etc.

Chemistry	David Frank	Dept. Head	231-591-2580	ASC 3021
Communications (Speech)	Trinidy Williams	Dept. Chair	231-591-3675	JOH 119
Electrical Engineering Technology	Ron Mehringer	Program Coordinator	231-591-2755	SWN 405
English	Debra Courtright-Nash	Dept. Chair	231-591-3988	ASC 3080
Humanities	Trinidy Williams	Dept. Head	231-591-3675	JOH 119
Manufacturing	Dean Krager	Program Coordinator	231-591-2511	Swan 108
Material Science	“	“	“	“
Mathematics	Kirk Weller	Dept. Head	231-591-2565	ASC 2021
Physics	David Frank	Dept. Head	231-591-2580	ASC 3021
Social Sciences	Meral Topcu	Dept. Chair	231-591-2735	ASC 2108

5. Non-academic Support Units

Scott Thede, Director of TAC
Technology Assistance Center (TAC): The Technology Assistance Center (TAC) is the first point of contact for computer support for Ferris State University faculty, staff and students. Mission Statement: The TAC is responsible for increasing the efficiency and productivity of the FSU community by providing a single point of contact for the rapid resolution of IT issues.

Karen Royster James, Supervisor-ASC/SLA
Academic Support Center Mission Statement: To provide all Ferris students access to a variety of academic skill-building opportunities that will assist them in their pursuit of academic excellence in a format that accommodates various learning preferences and schedules.

William Potter, Associate Provost, Retention & Student Success
Educational Counseling & Disabilities Services (ECDS): ECDS provides professional counseling to students for their career and educational pursuits. Educational counseling facilitates the exploration of strengths and challenges in a student's academic performance through insights into the learning process. Career counseling offers students the opportunity to explore career fields and potential areas of study. Disabilities Services serves and advocates for students with disabilities. Information, reasonable accommodation, assistive technology and counseling are offered.

Karen Royster James, SLA Supervisor
Structured Learning Assistance program (SLA): The SLA program models the behavior of successful students. The goals and efforts of SLA are tied to the university mission, course purpose, and world of work. We create learning partnerships that involve faculty, SLA facilitators, and students. SLA Workshops are paired to courses with high failure and high student withdrawal rates. SLA offers students up to 45 hours per semester of extra time on task at no additional cost to the student.

Brooke Moore, Coordinator of First-Year Services
Ferris State University Seminar (FSUS): The Mission of the Ferris State University Seminar Class is to provide first year students with personal connections, knowledge, and resources that will enhance their potential for learning, safety, satisfaction & graduation. The goals of FSUS are to facilitate student transition from high school to university life and by so doing improve student academic performance and retention. Students will develop a relationship with FSUS faculty members that will serve as an internal model for interactions with future teachers.

Renee Vander Myde, Director, Counseling and Health Centers
Personal Counseling Center (PCC): The PCC staff builds on the foundation that personal counseling is a therapeutic and educational experience for students in their personal and academic growth. The PCC also assists students who are experiencing more serious forms of stress and disruption to their normal functioning by utilizing a variety of therapeutic interventions. Prevention and educational aspects of a healthy lifestyle are emphasized

throughout the counseling process as well as through programs targeted at significant topics for students.

Scott Garrison, Dean of the Library
Fran Rosen, Acquisition & Collection Development Librarian,
and College of Engineering Technology Liaison Librarian
Ferris Library for Information, Technology and Education (FLITE):
Student Services - Get help locating information, navigating library resources, checking out material and class reserves. Faculty Services - Find your library liaison, receive help with research, book an instruction class, and/or a FLITE room. About Us - Find general information about FLITE, including a staff directory and library policies. Databases - Search for articles, legal documents, business reports, medical and scientific tables, biographies, and more. Online Catalog - Find books, government documents, videos, music recordings, and other materials housed in FLITE. Instruction - Learn how to use the Library, take an online tutorial and find class specific resources. Reference - Ask a research question, view subject guides for Web and print resources, and use Inter-Library Loan or Distance Education Services. Special Collections - Use our archives, government documents, and patent/trademark collections.

Sara Dew, Director of Financial Aid
Scholarships. Ferris State University and the College of the Technology offer a variety of scholarships to assist students in financing their education. In addition to those based on need, Ferris State University, in conjunction with 'friends' of Ferris (companies, alumni, philanthropists, etc.) offer scholarships to recognize academic achievement and special talents. The College of Technology currently offers over 125 scholarships to their students.

John Randle, Student Employment and Financial Aid Advisor
Student Employment assists students in finding on-campus and local off-campus positions. Part-time employment is available to students as both on and off-campus work study, on-campus non-work study, local off-campus, and "Quick Cash" opportunities.

Leroy Wright, Dean of Student Life
Angela Roman, Director for Center of Leadership and Career Services
Student Organizations. The Office of Student Leadership & Activities makes it easy to use and develop talents through Student Activities. Getting involved on campus helps build careers and personal skills, meet new people, share ideas, and learn more about one’s self. The College of Technology has over twenty student organizations (SO) including Women in Technology; this SO provides the female students in the College of Technology an opportunity to interact for support and camaraderie, and to share information about the various programs in the college. The SO establishes mentoring opportunities to potential female high school students and incoming Ferris State University freshman and also provides a means to explore possible career paths and potential job opportunities in technological fields.

Michele Albright, Coordinator of Career Services
Career Services assists students in finding internships and full-time positions. Students/alumni have access to e-Recruiting which is a state-of-the-art internet-based software package that allows students/alumni to upload their résumé into the FSU Résumé Book, search and apply for

internship/employment opportunities and sign up for on-campus interviews. On-campus interviews take place both fall and spring semesters with approximately 150 employers participating per academic year. Career Services also provides daily walk-in résumé review hours, mock interviews, job search counseling, group presentations. In addition, each academic year, Alumni Relations, College of Business's Internship Office, and SE&CS present "Career Tactics Workshops," which includes workshops such as an etiquette dinner, employer panel, dress for success, etc., which allow students to enhance their job search skills and preparedness.

Organizational charts for supporting units follow.

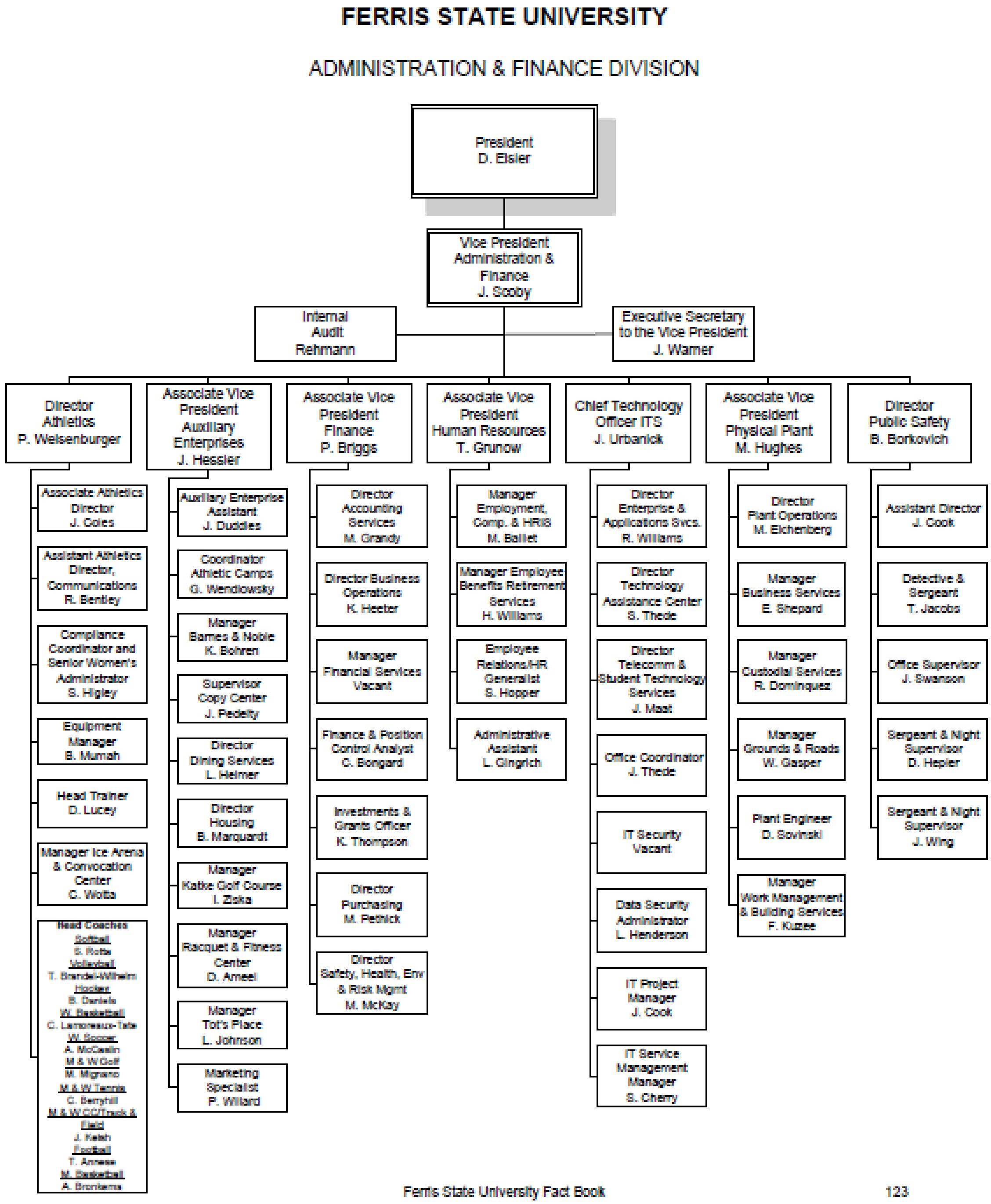

Figure D-12. Administration & Finance Division Organization

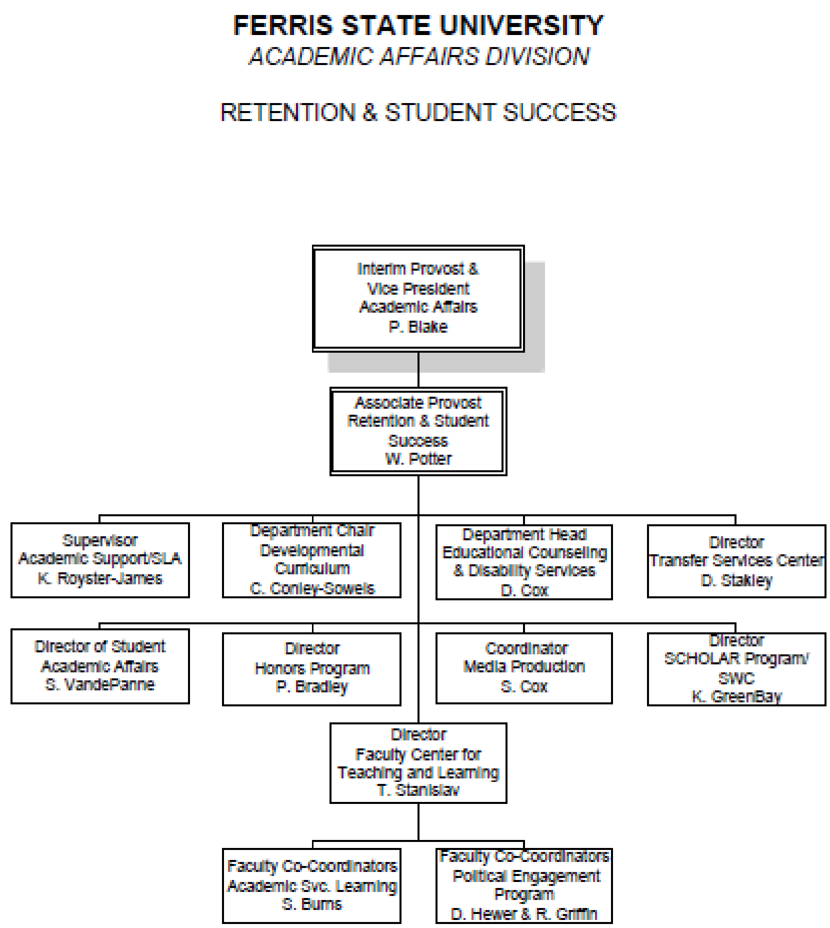

Figure D-13. College of Retention & Student Success Organization

FERRIS STATE UNIVERSITY
ACADEMIC AFFAIRS DIVISION

LIBRARY

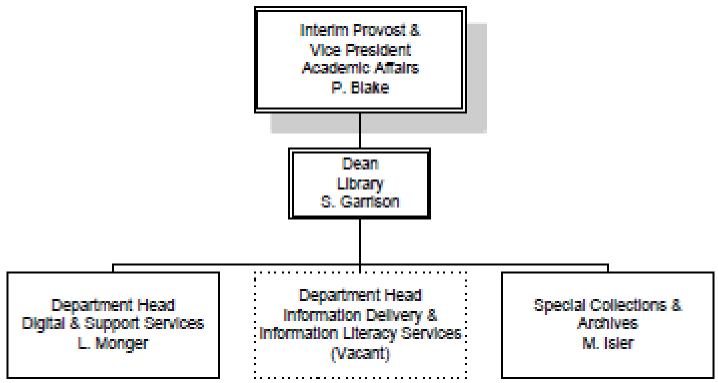

Figure D-14. Library (a.k.a. FLITE) Organization

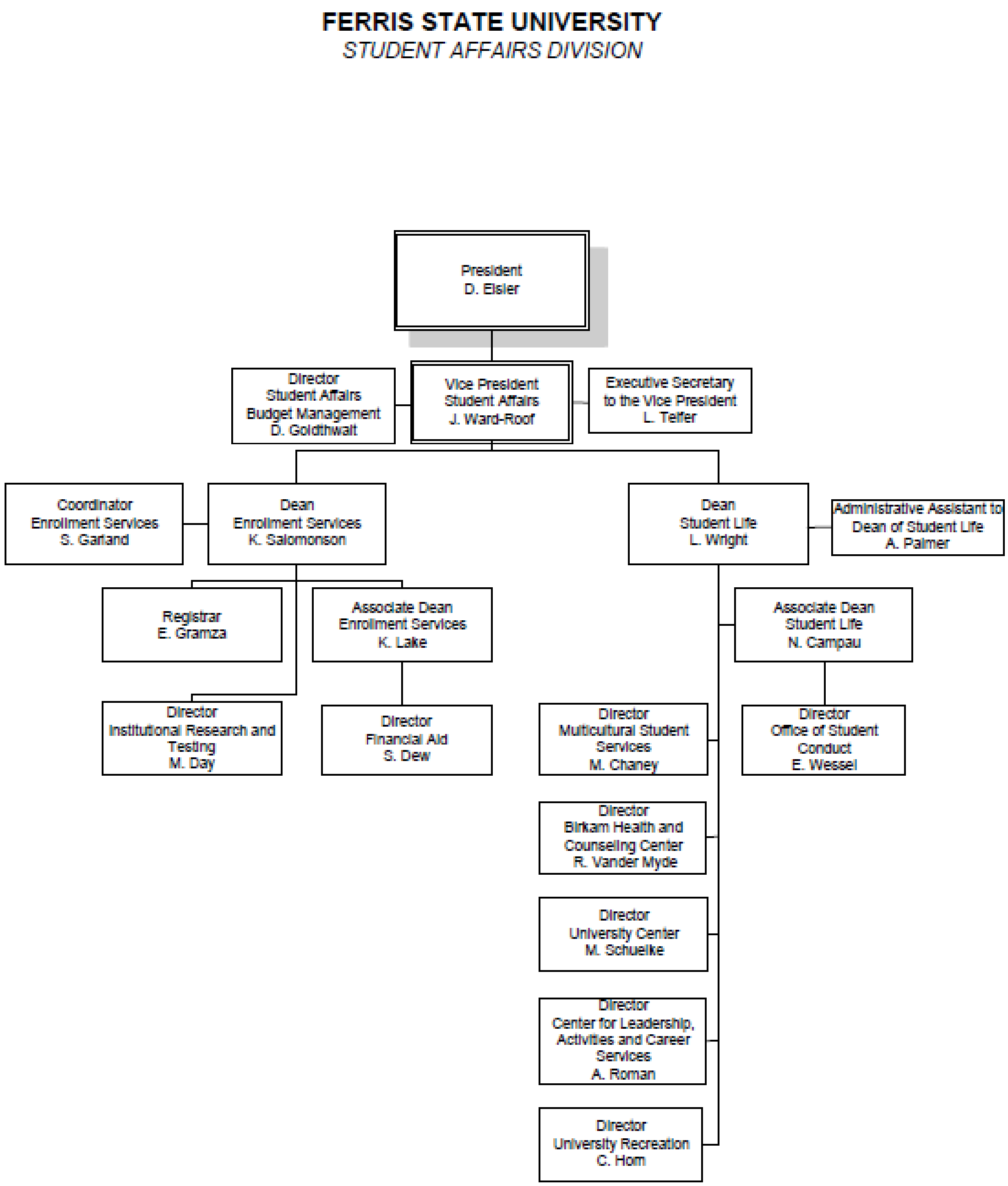

Figure D-15. Student Affairs Organization

FERRIS STATE UNIVERSITY
STUDENT AFFAIRS DIVISION

ENROLLMENT SERVICES

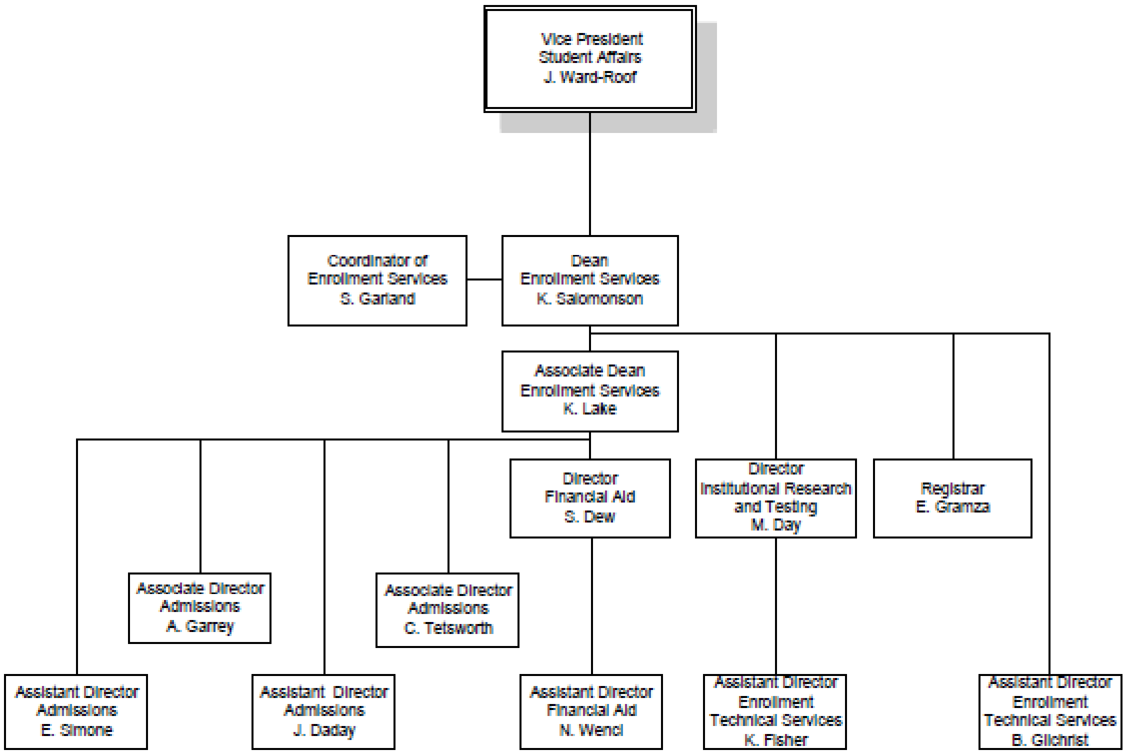

Figure D-16. Student Affairs Organization

FERRIS STATE UNIVERSITY

UNIVERSITY ADVANCEMENT & MARKETING

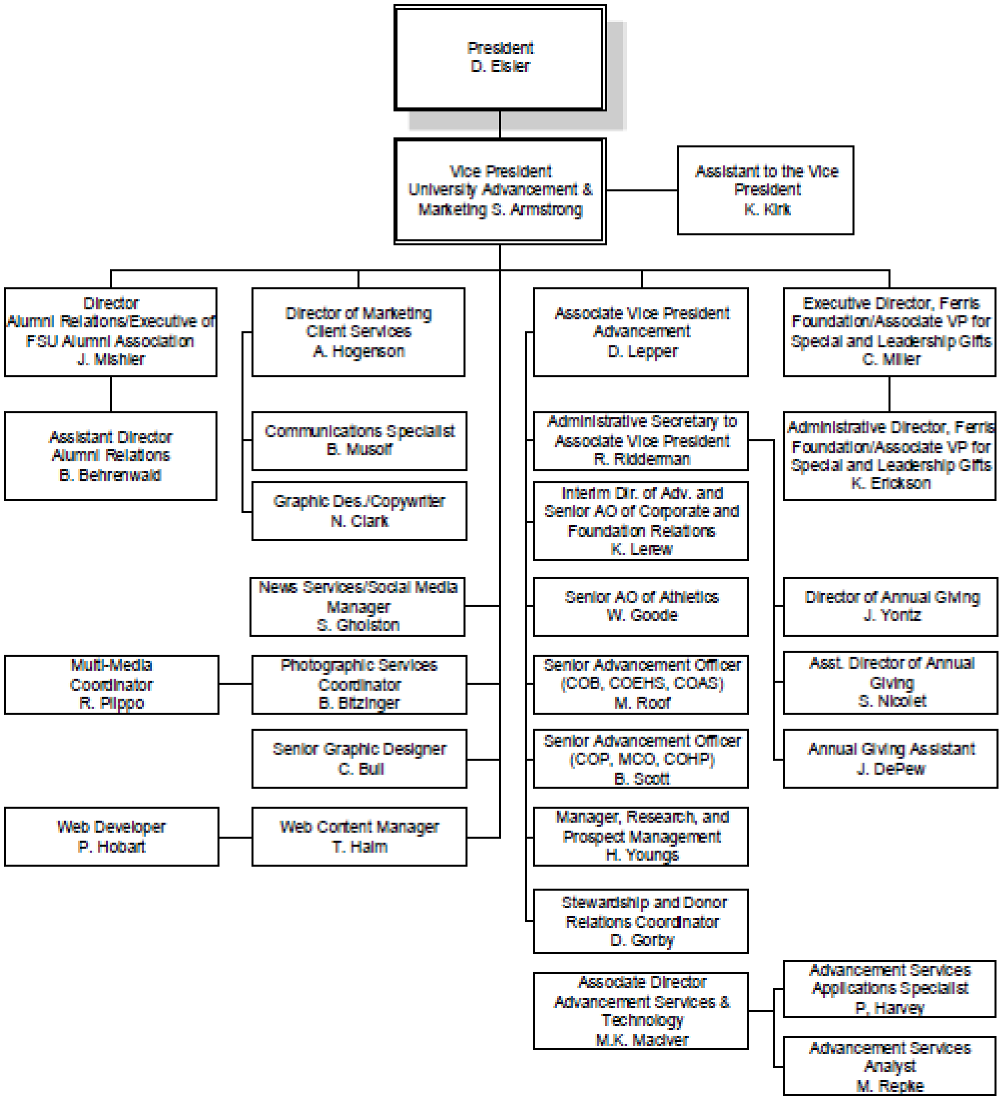

Figure D-17. University Advancement & Marketing Organization

G. 6. Credit Unit

It is assumed that one semester or quarter credit normally represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations. If other standards are used for this program, the differences should be indicated.

At this institution, one semester hour of credit is given for:

1 hour of lecture per week for a semester

or

1-4 (typically 2-3) lab hours per week for a semester

or

variable for practicum

7. Tables

Complete the following tables for the program(s) undergoing evaluation.

Table D-1. Program Enrollment and Degree Data

Mechanical Engineering Technology (Bachelors)

Academic Year		Enrollment Year[1] 1st	2nd	3rd	4th	5th	Total Undergrad	Total Grad	Degrees Awarded Associates	Bachelors	Masters	Doctorates
Current 2014/2015	FT	57	50	47	37		55			22[2]		
	PT											
1 2013/2014	FT	63	60	41	31		57			21		
	PT											
2 2012/2013	FT	59	44	32	25		48			19		
	PT											
3 2011/2012	FT	53	30	19	22		32			22		
	PT											
4 2010/2011	FT	28	30	25	24		50			15		
	PT											

1. Ferris State MET Programs: Reported under Enrollment Year are MET enrollments in key Fall Semester classes, i.e. classes on the MET checksheet for those semesters. Only MET enrollment is shown.
   1st year: MECH 111   2nd year MECH 211   3rd year MECH 330   4th year MECH 421
2. Official final graduation numbers are not available at time of report.

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the on-site visit.
FT--full time
PT--part time

Table D-2. Program Enrollment and Degree Data

Mechanical Engineering Technology (Associates)

	Academic Year		Enrollment Year[1] 1st	2nd	3rd	4th	5th	Total Undergrad	Total Grad	Degrees Awarded Associates	Bachelors	Masters	Doctorates
Current 2014/2015		FT	57	50				139		17[2]			
		PT											
1 2013/2014		FT	63	60				125		34			
		PT											
2 2012/2013		FT	59	44				111		31			
		PT											
3 2011/2012		FT	53	30				87		26			
		PT											
4 2010/2011		FT	28	30				71		27			
		PT											

Ferris State MET Programs: Reported under Enrollment Year are MET enrollments in key Fall Semester classes, i.e. classes on the MET checksheet for those semesters. Only MET enrollment is shown.

1st year: MECH 111 2nd year MECH 211

2. Official final graduation numbers are not available at time of report.

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the on-site visit.

FT--full time
PT--part time

Table D-3. Personnel

Mechanical Engineering Technology

Year[1]: 2014-2015

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[2] (Director 25% to MET + Program Coordinator 50%)	2 [25%] [50%]		0.75
Faculty (tenure-track)[3]	4 [3x100% 1*50%]		3.5
Other Faculty (excluding student Assistants)		3 [1*20/36 +2*10/36]	1.11
Student Teaching Assistants[4]	-none		
Technicians/Specialists	-		
Office/Clerical Employees	3 total [1*25%, +2*12.5%]		0.50
Others[5]			

Notes: Other faculty are PT. FTE is based on 36 contact hr/year being full time.
3 office/clerical in School. academic secy, 25% MET, financial/director secy, 12.5% MET, Surveying equipment clerk/recruiting secy, 12.5% MET

Report data for the program being evaluated.

1. *Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.*

2. *Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.*

3. For faculty members, 1 FTE equals what your institution defines as a full-time load:

<u>Ferris State</u>: 12 credits, 18 contacts, 360 students per class or 27 student interns equates to 1 FTE per semester.

4. *For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc*.
5. Specify any other category considered appropriate, or leave blank.

Signature Attesting to Compliance

By signing below, I attest to the following:

That ________________________ (*Name of the program(s)*) has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Technology Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*

____
Dean's Name (As indicated on the RFE)

_________________________________ ________________________
Signature **Date**

Ferris State University
MECHANICAL ENGINEERING TECHNOLOGY

August 13, 2015

Academic Program Review Council
Academic Affairs
Ferris State University

Re: Supplementary Comments Regarding AAS and BS in Mechanical Engineering Technology

Dear Council Members:

The main submittal for the Mechanical Engineering Technology programs, AASMET and BSMET, is in the "ABET Self-Study Report for the Mechanical Engineering Technology B.S. and A.A.S. Programs" included in this pdf file. This letter provides additional commentary perhaps relating to topics not part of the charge of academic Program Review.

The AASMET program, beginning in 1970, was the first engineering technology program in the College. A proposal to create a BSMET program in 1986 was not accepted. BS degrees in Manufacturing, Plastics, and Welding Engineering Technology began about that time as did a BS in Product Design (1988) along with other BSET programs. A new BSMET proposal was eventually accepted in 2000. The first graduates of the BSMET were the class of 2002. The program is among the newest and has grown to become one of the major programs in the College. Cost and support levels have been very low.

915 Campus Drive, SWN 405
Big Rapids, MI 49307-2291

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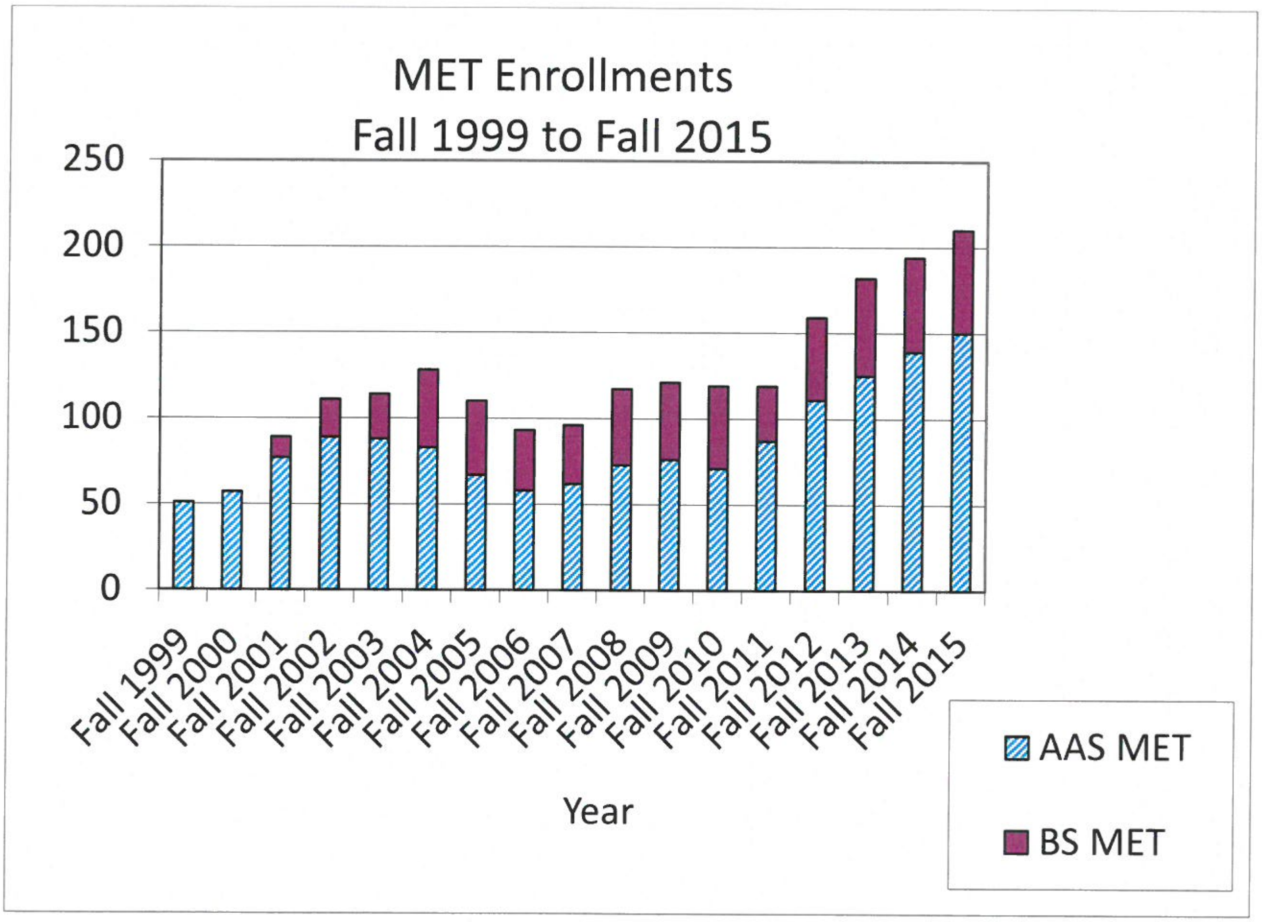
Web: www.ferris.edu/mech

Enrollment Trends

There has been a national trend of increasing enrollments in Mechanical Engineering and Mechanical Engineering Technology programs. MET at Ferris reflects this and in a state with declining secondary school enrollments.

Fall 2015 count is based on a WebFocus report done in early August. Others are the official 4th day counts from the Ferris Factbooks.

As described in the ABET Self-Study, the MET program does not do direct marketing. Students and faculty are involved in activity that promotes the College and University. Letters are sent to applicants inviting them to campus. Folders on over 160 visitors and phone calls from potential students were kept by the coordinator this past year as a measure of the time that goes into recruiting.

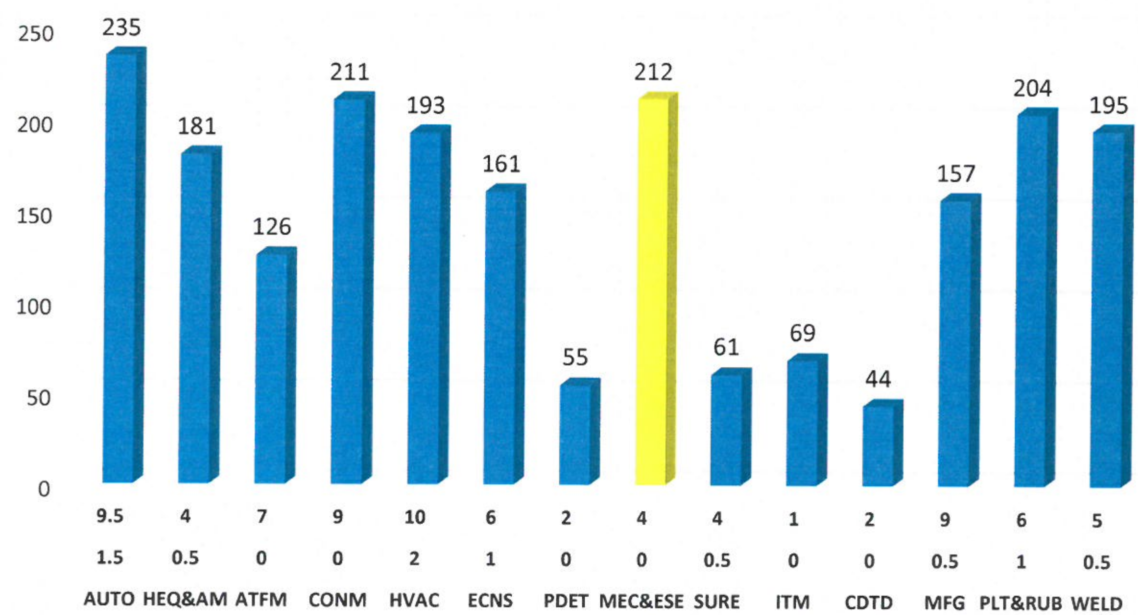


Comparative FTE and Non-Secretarial Support Staff Resources

This chart reflects personnel assigned to programs. Estimates are somewhat rough due to the variable contributions of adjunct faculty and split support staff. An attempt is made to account for tenure-track and full-time adjunct positions. The support staff count includes technicians, clerical support directly tied to equipment, and a recruiter. Secretarial support is not included here and is assumed to be approximately level.

MET does have a new tenure-track position for 2015-16. Other changes are unknown.

Fall 2014 College of Engineering Technology
Enrollment vs Faculty and Support Staff
Columns: Program Area Enrollments
First Row: FTEs
Second Row: Non-Secretarial Support Staff



Potential Students

Data from a Web-Focus Report SG0054RB-CET on August 13, 2015 implies that the Registered to Admit ratio for MET is very low: 47 applicants registered of 189 that were admitted. Restating, about 25% of those admitted to MET decided to attend. A comprehensive study has not been done, but an informal telephone survey done years ago as well as one done this summer that was directed at female students indicate that admits are typically choosing other schools.

Is there an opportunity here?

Lab Space Issues

Emphasis in engineering technology programs has long been on hands-on experiential learning. For Mechanical Engineering Technology, this means labs to run equipment and space and facilities to design, build, and test a great variety of mechanical and thermal systems and components.

A Look at Other Facilities on CET:

Granger Center. A showplace. Very roomy. Great for HVACR and Construction programs.

National Elastomer Center (NEC). Another showplace. Great for Plastics and Rubber programs. Very nice large spaces.

Heavy Equipment Building. Also a showplace with space that doesn't seem to have purpose.

Automotive Center. The building is huge. Much of the building shows its age. There has been very nice remodeling in several areas including major projects this summer. Many recent updates. Major lab additions – engine dyno, built-in floor dyno, new labs.

Swan Building houses multiple programs.

- Electrical/Electronics programs. $400k upgrade about 12 years ago – floors, furniture, lights, some equipment - it shows very well.
- CAD program. Major computer lab upgrade with large, commercial furniture also about 12 years ago. Air-conditioned.
- Architecture/Facilities Management. Very large and nicely furnished and decorated spaces for the AAS program. Considerable additional space with the addition of the BS Arch to provide individual studio space for each student. The programs want better.
- Welding. Lab space addition $xxxk 15 years ago, $100k to convert classroom into testing lab 8-9 years ago, $900k for ventilation system. Impressive. Well used space when classes are present.
- Manufacturing: Large space. Recent $400k for a new equipment boost to keep the program going.
- Product Design. Minimal lab space. $35k for re-furnishing in a classroom. More space for 3D printing.
- Mechanical Engineering Technology. The program was initially put into an abandoned chemistry lab. Approximately 15 years ago the remaining wet benches and all but one fume hood were removed. Lights were upgraded at about that time. Several abandoned Printing rooms have been assigned. MET students and faculty have had to remove equipment. Other than the addition of double doors and lighting upgrade in one room, nothing significant has been done to these spaces. The additional space, if only temporary, is appreciated. Faculty have furnished the spaces mostly with discarded furnishings from across the campus.

The MET program has a long history of requesting more appropriate lab space.

Conclusion: Many program areas have impressive lab spaces – important for teaching and for recruiting. Would the University benefit if MET was among them?

Swan Expansion Project

The University has been developing a $30M proposal to the State to expand the Swan Annex to double the size of labs for the Welding and Manufacturing programs. Plans call for making these showplaces – an excellent idea. A lot of work has gone into this process. However it became clear that these programs wanted to take over the entire existing second floor of the Annex to create lecture and office space. This is where the MET and other labs have been located – and bump these labs into the Swan Tower into little used classrooms. Although affected, the MET program had no representation in this process. Faculty appealed to the Provost (letter attached).

MET was "invited to the table" during Spring 2015. MET perhaps had some influence in keeping some of the second floor lab space, although many options were not negotiable. MET continues to object to all of the lecture space being created when there is no shortage and so much unused lecture space as it. The proposed rooms are much larger than need be when compared to other satisfactory rooms such as NEC 203 and Swan 404.

Not addressed in the planning is the need for shop space for MET students. MET students need to build things. Many are involved in intercollegiate team competitions. This has been an issue for many years. Present rooms used for projects are to be displaced.

MET faculty look forward to the site visit by the Council.

Teaching Loads

With four tenure track faculty and four part-time adjunct faculty, the Faculty Load Sheet for 2014-15 shows 6.21 FTE based on credits. This includes the prefixes: MECH, ETEC, and ESEN.

For Fall 2015, even with our 5th position filled, the Faculty Load Sheet shows 6.75 FTE based on credits and 6.94 FTE based on contacts for the semester. Lectures in classes such as MECH 211, 330, and 440 were combined to reduce loads and make the semester feasible. Lectures, that should be taught to groups of 25-30, are now at 39, 51, and 59. This reduces overloads, but not work. These classes are well above caps. Labs best taught with 12 have been pushed up to 16. We have five part-time adjunct faculty plus another from the Product Design program assisting with load this Fall. This is not ideal.

Productivity

The dominant prefixes for the MET seniority group are MECH and ETEC. For 2013-14 MECH productivity was 609 SCH/FTE while ETEC productivity was 571 SCH/FTE. These are well above the College average of 399 SCH/FTE and university average of 469 SCH/FTE. The program is quite likely to be profitable for the university

(Productivity for Energy Systems ENGY courses, taught by a very capable adjunct, was 279 SCH/FTE.)

Budgets

While outside the Council's mission, MET has one of the lowest, if not the lowest, S&E allocations among programs in the College. Budget information on all programs is not readily available. Information provided at an All-College meeting several years ago showed one program with an initial allocation of approximately $100k vs $27k for MET. The number of students was about the same. The difference represents over 0.5 FTE and becomes a significant accumulation over time. Should cost be part of APR?

The faculty in Mechanical Engineering Technology look forward to the results of your review.

Respectfully,

Chuck Drake

Chuck Drake
Program Coordinator, Mechanical Engineering Technology

FERRIS STATE UNIVERSITY
MECHANICAL ENGINEERING TECHNOLOGY

November 24 2014

Paul,

We are very concerned about the recent turn in the plans for the Swan expansion.

During the 2010 and prior Academic Program Review cycles Mechanical Engineering Technology was identified as a program that was to be enhanced with additional lab space. This has not happened.

Current plans call for 25,000 additional square feet of lab space for our Welding and Manufacturing programs. This is a major upgrade for these excellent facilities. This is great, but now they want more.

Plans now call for converting 2nd floor lab space into more classrooms. This lab space could well serve the needs of other programs. We do not have a shortage of classrooms here.

Elaborating:

A. Available Lab Spaces:

Swan 221, 222, and 224, on the Ives Avenue side of the Annex, have been labs for printing equipment. They are ideal for engineering labs with their concrete floors, high, unfinished ceilings, power drops, compressed air, and water in several places. They are fine as partitioned – i.e. walls, storeroom, office would not need to be changed. They resemble the engineering labs where we do class visits as well as the labs from our personal engineering experience.

These are ideal rooms for Mechanical Engineering Technology (MET). They would provide the lab enhancement promised by our last APR, provide reasonable space for our many student projects – both for interdisciplinary teams and for classes such as senior project, senior lab, fluid mechanics, fluid power, mechanical measurements/mechatronics, freshmen seminar, and special projects. They would give MET some room. They would give MET presentable space such that we could finally join other programs with the "Come look at our facilities" marketing. A Fall 2012 study by CET leadership came to the conclusion that MET lab space should be moved into four rooms on the second floor of the Swan Annex. This proposal was presented to Academic Affairs in January 2013 although not acted upon. We have using one of these rooms but now are told it will transferred to Manufacturing with, at best, the possibility for us of sharing it on occasion.

The net lab space enhancement since our last APR is nothing.

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B. Swan Lecture Rooms:

The current proposal calls for the creation of 6 additional classrooms with one current classroom being converted into offices for MFG and WELD. The need is very questionable. Present lecture rooms are clearly underutilized. A quick survey found that no classes were scheduled in SWN 311* this Fall. Swan 308 has 2 hours per week use while Swan 502 has just 4 hours use per week use. Creating 6 new classrooms mostly from needed lab space seems wasteful. We need lab space.

One plan is to give MET a few leftover classrooms to become labs. This is an insult. These rooms have narrow doors, carpet or tiles, drop ceilings, generally no compressed air, water, power drops, etc. We will be limited to minimal sized projects and teaching equipment again. This is off-mission.

C. Program Enrollments

It is noteworthy that, with our BS degree being barely 10 years old, MET is one of the largest programs in CET. Growth has been over three-fold in the last 12 years – more than any other program.

Additionally, our faculty productivity is the highest (649 cr/sch 2012-13) in our college and well above the university average. If an honest and open cost study done, MET would most likely be the lowest cost program in CET. We have been below the university cost average in the past.

Conclusion:

- There has been no lab space enhancement for MET as required by APRC.
- The addition to Swan for Manufacturing and Welding is a great addition to FSU.
- Mechanical Engineering Technology is very closely allied with these disciplines. We should be close.
- Destroying useful lab space to create more and unneeded lecture rooms – then making unwanted lecture rooms into inferior labs - does not make sense – and serves who???
- The Welding – Manufacturing addition is going beyond its purpose by taking space beyond its 25,000 square foot lab space addition and taking away lab space needed by others.
- The interests of all stakeholders should be represented in these decisions.
- This plan needs to be re-evaluated.

Respectfully,

Chuck

Chuck Drake
Program Coordinator, Mechanical Engineering Technology

*Swan 311, MET set up a temporary lab in this room partway into the semester once it was determined that there were no classes scheduled in that room.