ETAC-ABET
Self-Study Report

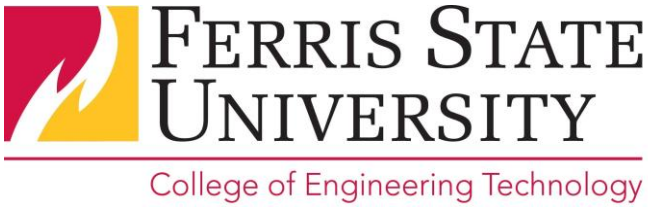
for the

Electrical/Electronics Engineering Technology BS (EEET)
and
Industrial Engineering Technology AAS (EEIT)

at

Ferris State University

Big Rapids, MI



June 2015

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BACKGROUND INFORMATION

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B. Program History

The EEET program was developed in the early 1980's with the first junior classes offered in the fall of 1984. The two-year EEIT (Industrial Engineering Technology) program, which constitutes the first two years of the 2+2 program, had been in existence since 1968. In the remainder of this document, the EEET program is this 2+2 program and the EEIT program is the Associates degree. The EEET curriculum was originally established with ABET accreditation in mind. Over the next several years, the courses were fine-tuned in regards to text, laboratory and lecture content. In 1994, Ferris changed from a quarter calendar to a semester calendar. This conversion provided an opportunity to make major readjustments without significantly changing the intent or outcome of the program. In 1995, the program was first accredited by TAC-ABET. Even though the EEIT was part of the 2+2 program, this is the first time the department has sought accreditation for the program in its own right. The courses have always been evaluated as part of the 2+2 program, but never accredited on its own merit. One of the motivating factors for this seeking accreditation is the university's Academic Program Review Council (APRC) policy. Ferris State University has had an APR Council for over fifteen years and required each of the 180 degree programs (certificates, minors, associates, and baccalaureate degrees) to complete, essentially, the same self-study as many accrediting bodies require. Over the past six years, the EEET department has had a faculty representative sit on the APR council and senate. In 2014 it was finally decided that accreditation self-studies would satisfy the APR requirement be it nursing, pharmacy, accounting, engineering, or other legitimate accrediting organization. This has given incentive for many programs to seek accreditation including the EEIT Associate degree.

Over the years, modifications have been made to the technical core of the EEET and EEIT programs along with the technical science electives, math and general education requirements. In 1997, three concentration tracks were developed in Communications, Digital, and Industrial Automation. The three concentrations served the program for over six years. In 2001, the department lost a faculty member whose expertise was in the field of Communications. The Communications concentration has suffered because of this loss; thus, the concentration has been dropped from the program. There have been no major program changes since the last accreditation visit in 2009. However, in the fall of 2015, largely as a result of the advisory committee and industry needs, the department will implement new program changes. These changes will be monitored and tracked in accordance with the continuous improvement plan.

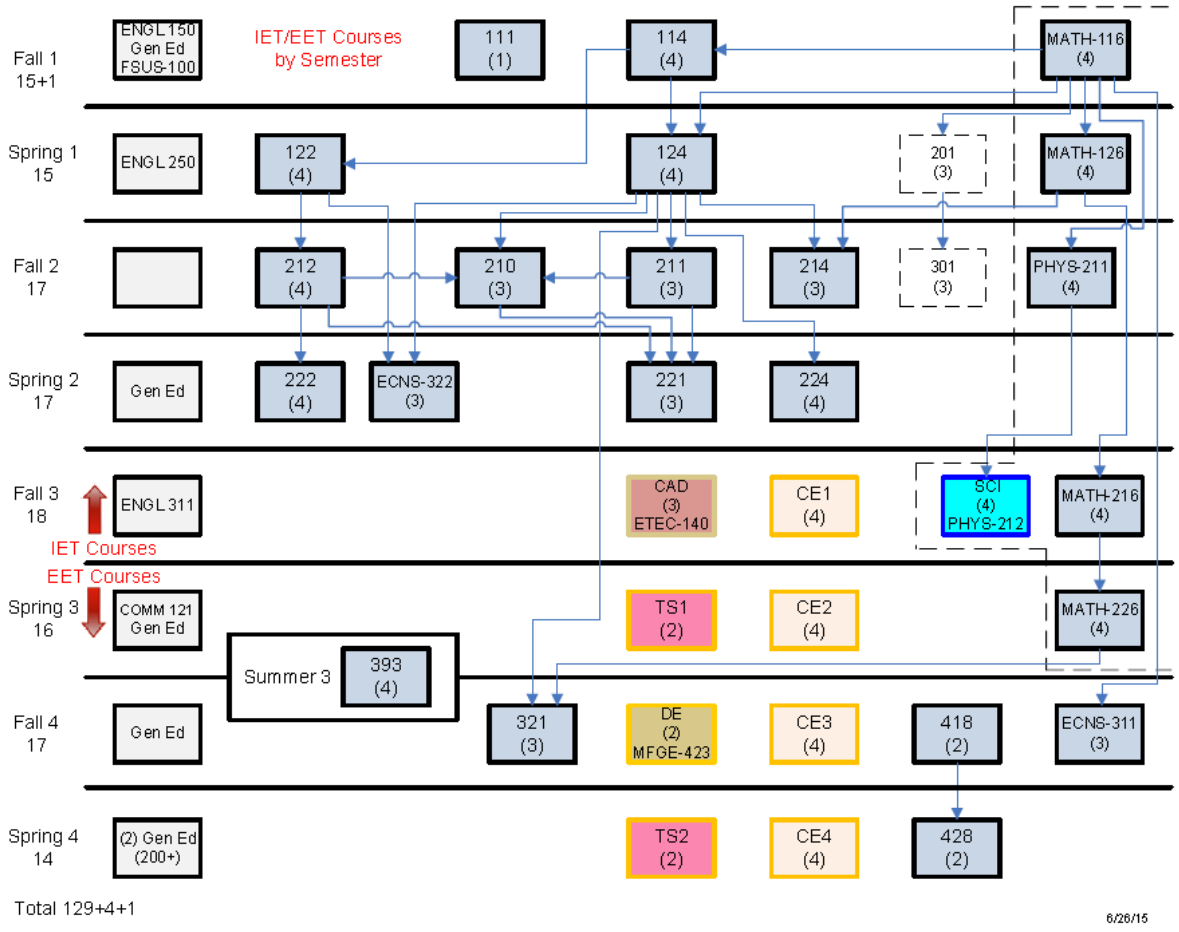
C. Options

- The EEET program has two concentrations: Automation and Digital
  - The Automation Concentration consists of 14-16 credit hours of industrial automation courses ranging from Programmable Logic Controller (PLC) programming incorporating four programming languages to Motion Control using Laplace and Fourier transforms.
  - The Digital Concentration also consists of 14-16 credit hours devoted to courses in advanced digital circuits and embedded systems.

In addition to, but not a part of, the Bachelor of Science Degree program are the following initiatives offered to those with an interest in electronics, but not necessarily interested in the four-year degree.

- Associate in Applied Science degree in Industrial Engineering Technology
  - The Industrial Engineering Technology program at Ferris is designed to provide students with the skills and knowledge necessary to function as technicians and/or engineering assistants. Graduates have the ability to perform PLC troubleshooting and machine diagnostics including, but not limited to, motors and three phase power. Technical courses taken in the associate's program transfer directly into the Bachelor of Science EEET program.

- Minor in Industrial Controls
  - The Minor in Industrial Controls is designed for individuals who are non-majors and wish to add automation to their degree. Students primarily come from the Welding and Manufacturing departments, however, there have been students from Automotive and Heavy Equipment.



D. Program Delivery Modes

Core courses are delivered on campus, during the day and on some evenings, using traditional lecture/laboratory methods. Many courses today are Web Enhanced (that is; they disseminate information but do not substitute the web for seat-time) and some lecture only courses will soon be offered fully online.

Some of the courses of the AAS and EEET program are classified as web enhanced. Web-enhanced courses at Ferris State U are defined as follows:

- Features typically include administrative uses of web materials such as posting of course syllabus, listing of schedule, course and instructor information, and posting of grades.

- Provides additional, but not exclusive, point of reference for pages of course content, links to websites, study guides, self-assessment activities, etc.

- Communication tools may be provided to facilitate contact with instructor and fellow learners.

- Participation in the web course space may or may not be required in order to meet course outcomes.

Several courses in the AAS and EEET program have been offered as web-enhanced courses: EEET 114, 124, 214, 321, 325.

Using EEET 124 as an example, there are communication links to announcements and email. There are course links to assessments (via Maple T.A.), assignments, calendar, contacts, glossary, groups, learning modules, my grades, policies and procedures, roster, syllabus and schedule. There are other resource links to Atomic Learning (tutorials on various software), library resources, and tools.

For the student's benefit, they are given access to all of the problems that will be used for practice problem (unlimited time, unlimited tries, no grade recorded), home work, (limited time, unlimited tries, no grade recorded, quizzes, (limited time, 3 tries, grade is recorded), and proctored tests, (limited time, 1 tries, grade is recorded). This configuration gives the student the opportunity to get to know the wording of the questions and can ask for clarification before they take an assessment that will be recorded into the gradebook. The student gets almost instant feedback on their performance, not having to wait the traditional 1.5 to 2 weeks from assignment given, assignment submitted, to assignment graded/returned.

An additional benefit of having the above assessment system in place is that students desiring to place out of a course or to get credit for a course, could be given access to the questions to prepare for the exam and then take the appropriate proctored tests. This affords the student better placement in the correct course than just at ACT scores.

E. Program Locations

All classes are currently delivered on the Big Rapids campus of Ferris State University.

F. Public Disclosure

Program Educational Objectives, Student Outcomes, and Enrolment/Graduation URL's are provided below. In addition, POEs and SOs are located in print form in the department office located at 405 Swan Building.

EEET Program Home page:

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

URL for Program Education Objectives is:

http://www.ferris.edu/HTMLS/colleges/technolo/ceems/eeet/pdf/objectives.pdf

URL's for Student Outcomes are:

http://www.ferris.edu/HTMLS/academics/gened/Learningoutcomes.html

http://www.ferris.edu/HTMLS/academics/gened/student-learning-outcomes.pdf

http://www.ferris.edu/HTMLS/colleges/technolo/ceems/eeet/pdf/outcomes.pdf

URL for annual student enrollment and graduation data is:

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

There are no Deficiencies, Weaknesses, or Concerns remaining from the most recent ABET Final Statement. All were addressed following the most recent visit and were cleared in the Final Statement.

GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

Admission to the associate's degree is open to high school graduates who demonstrate the academic preparedness, maturity, and seriousness of purpose with backgrounds and interest in math and science. A 3.0 high school GPA and an ACT composite of 21 are the average levels for beginning students. The minimum ACT composite is 18 and a high school GPA of 2.75 is required for admission.

Access to the EEIT and EEET program is specified on the program Internet homepage for prospective FSU students, as well as transferees from other programs within FSU. This site is outlined below:

Electrical/Electronics Engineering Technology (EEET):

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

Admissions:

http://www.ferris.edu/HTMLS/colleges/technolo/ceems/eeet/Admissions.htm

In addition, articulation agreements with community colleges and 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/Guide/technology.htm

http://www.ferris.edu/admissions/transfer/WebPages/TranArtic.htm

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

Transferring into the EEET program has the following basic requirements for prospective students:

- An Associate's degree in a related program (usually FSU Industrial Electronics Technology)
- Minimum GPA of 2.0 in the Associate's degree
- Transferable mathematics courses through pre-calculus

B. Evaluating Student Performance

In both the EEIT and EEET programs, before a student can register for classes in any semester, he/she must have a registration hold cleared by his/her advisor. 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 (e.g. with GPA less than 2.00) 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.

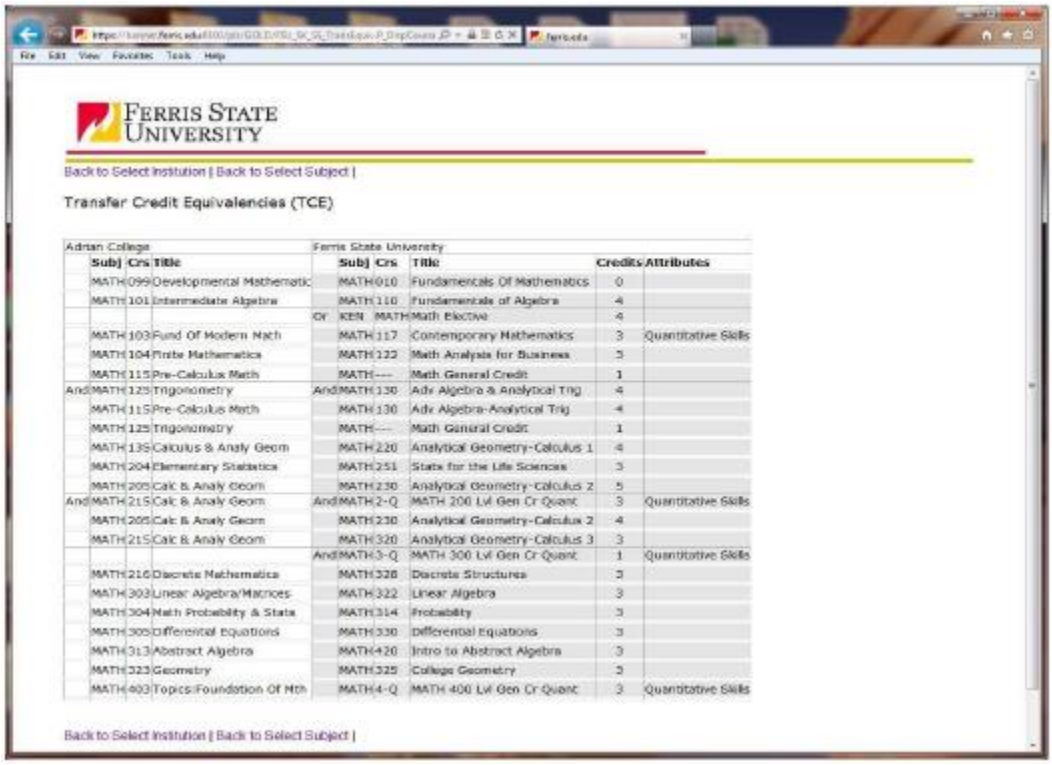
To ensure that students meet the proper pre-requisites, the registration software will not allow a student to register for a class unless all of the pre-requisites have been met. The criteria may be overridden by the school secretary upon written notice by the advisor and/or affected faculty member. In addition, faculty utilize a program called MyDegree in which they can create and lock a "plan" for the student and the student can track their progress 24/7 using the active worksheet. Example screenshots are provided in Section D of this criterion.

C. Transfer Students and Transfer Courses

Transfer students apply for admission in the same manner as described above. They are then required to have official transcripts mailed from the educational institution to the FSU Admissions and Registration Office. Once the transcripts have been received, the transcripts are evaluated. Ferris has a list of college equivalencies (see the following figures).

http://www.ferris.edu/HTMLS/colleges/university/transfer/Guide/homepage.htm

The Transfer Equivalency web page identifies the Michigan Institution (note that out-of-state institutions are also available). Click on the school and the transfer course subjects are listed. Clicking on a particular course prefix will identify the other institutions course and the Ferris equivalent. The following figures shows the results of a mathematics search.



Students and faculty can also check the particular transfer equivalencies within the student's record using the MYFSU computer system.

Students can also transfer their general education requirements 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. A copy of the Academic Affaire Policy Letter on the MACRAO Transfer Policy dated 10/08/08 is attached to the end of this section of the report.

http://www.ferris.edu/HTMLS/colleges/university/transfer/postsecondary/macrao.htm

The Academic Affairs Policy Letter on Policy on Transfer Credits for Various Grades, Letter 01:7 dated December 11, 2001 is also attached to the end of this section of the report.

http://www.ferris.edu/HTMLS/administration/academicaffairs/policyletters/01-7-Transfer.pdf

Articulation agreements are in place with most community colleges in Michigan (and some out of state) to facilitate matriculation with relatively few lost credits. Students must have a 2.0 GPA from their respective community college.

In addition, articulation agreements with community colleges and 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/homepage.htm

ACADEMIC AFFAIRS POLICY LETTER

MACRAO Transfer Policy
General Education Courses
Approved by Academic Affairs 10/08/08
Effective Fall 2010
Revised Spring 2015

The Michigan Association of Collegiate Registrars and Admissions Officers (MACRAO) Transfer Agreement applies only to students entering bachelor degree programs at FSU, pertains solely to general education, and does not exempt students from meeting specific prerequisite and/or course requirements for their degrees. Only courses with a grade of "C" (2.0) or better will transfer.

Students transferring to Ferris State University with the "MACRAO Satisfied" endorsement will have satisfied the following lower-level general education requirements:

- lower-division Communication Competency;
- Scientific Understanding;
- Cultural Enrichment;
- Social Awareness;
-

Race, Ethnicity, and Gender; and
•
Global Awareness.

In order to complete the general education requirements for a bachelor's degree, students with MACRAO must still complete math proficiency and upper-level communication competency requirements. In some instances, a student may have satisfactorily met these additional requirements prior to transferring to Ferris.

Many degrees require completion of program-specific courses and prerequisites that also satisfy FSU general education requirements. These requirements must be completed even if a student has earned the "MACRAO Satisfied" endorsement.

Students who started college prior to Fall 2014 will be able to complete course work under the existing MACRAO Agreement until the end of Summer 2019. Transcripts for students entering Ferris after Summer 2019 with a "MACRAO Satisfied" endorsement will be evaluated on an individual basis.

ACADEMIC AFFAIRS POLICY LETTER

December 11, 2001 01:7

POLICY ON TRANSFER CREDITS FOR VARIOUS GRADES

Admissions Policy: Transfer Students

Students transferring to Ferris State University (FSU) from other institutions of higher education may be granted transfer credit. Transfer credit is subject to the following criteria:

General Considerations

1. If FSU has an institutional articulation agreement with the student's prior institution, that agreement governs the student's transfer determination if covered by the articulation agreement. Otherwise, the student's transfer determination is governed by individual course equivalency evaluations and FSU's transfer policies or as determined by FSU in its sole discretion.

2. Institutional articulation agreements will focus on conditions for accepting students (with specific degrees and GPA's) and transferring them into FSU's programs, not determining course-by-course equivalencies.

3. Credits are considered for transfer upon presentation of official evidence of completion (i.e. official transcripts, DD214, etc.).

4. College-level coursework taken at a regionally accredited institution is transferable to FSU. An applicant with a cumulative GPA of 2.0 or higher is admissible. An applicant with a cumulative GPA of less than a 2.0 may be admitted at the sole discretion of Ferris.

5. Ferris accepts transfer courses in which the student earned a grade of "C" (2.0) or better. Consistent with program progression policies, coursework taken at other institutions and not accepted for credit at FSU may need to be repeated. All references to a 2.0 GPA are on a 4.0 scale.

6. Additional information concerning the transferability of college credit is included in the University catalog, which describes the degree programs offered through a specific Ferris college. Under special circumstances, after twelve semester credits of work at Ferris have been successfully completed, the appropriate college dean's office may accept coursework from institutions which are not regionally accredited, according to the guidelines of this policy.

7. Credit may be granted for military training courses, group study, or correspondence work if the course(s) or other work is recommended for credit by the American Council on Education or approved through an appropriate Ferris competency assessment process.

8. Credits from transferred coursework are recorded on the FSU transcript, but do not count toward the FSU cumulative GPA or academic honors computations.

Transfer Students: Course and Transcript Evaluation

1. Transcripts of transfer students are evaluated by the dean's office of the college in which the student enrolls.

2. Transfer course equivalency evaluations are determined by the FSU department with comparable coursework as indicated by the Ferris course designator. These evaluations represent an institutional determination and will not be independently renegotiated by each FSU college. That is, if a transfer student enters Ferris and then changes program and college, the initial transfer course equivalent determination is not changed unless a determination that an error in the evaluation has occurred, or prerequisite validation occurs per #4 of this section. This determination is at the sole discretion of Ferris State University.

D. Advising and Career Guidance

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. New faculty members are not assigned advisees during their first year of employment to allow them time to learn and understand the curriculum. During this time, they are mentored in numerous areas including advising. In the EEET and EEIT programs, faculty advise only those students who are enrolled in those programs. 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. They will not be allowed to graduate unless they complete all the requirements of the program. They must also maintain a minimum cumulative grade point average (GPA) of 2.0. Any student falling below

that threshold will not be permitted to graduate even though they have fulfilled all other university and program requirements.

Students and faculty can also track the student's progress through the program using MyDegree. MyDegree has been found to be very useful by the faculty advisors in that it allows them to create and lock a plan for the student to progress through their four years. It is useful for both the AAS and BS degrees and can be set to show either program. As a student completes the AAS degree (or is approaching completion) the view can be changed to reflect the BS degree. Again, a plan can be created for the student by the advisor and locked so that only those with advising rights can make future changes. MyDegree works equally as well for transfer students in that, once transfer equivalencies have been established, a plan is created and locked. The student may elect to deviate from the plan, but they do so at their own peril. The next figure shows a screen shot of the MyDegree pages of worksheet and the planner for the AAS and the BS programs.

MyDegree

FERRIS STATE UNIVERSITY *IMAGINE MORE* MyDegree

Student View AB72APhB as of 06/19/2015 at 08:56

Student		Level	Undergraduate
ID		Degree	Associate in Applied Science - AAS
Classification	Sophomore	College	College Engineering Technology
Advisor	Klope, Warren A	Major	Industrial Electronics Tech. - EEIT
Overall GPA	3.000	Minor	

Disclaimer

You are encouraged to use this degree audit report as a guide when planning your progress toward completion of degree requirements. Your academic advisor may be contacted for assistance in interpreting this report. This audit report is not your academic transcript and it is not official notification of completion of degree or certificate requirements. Transfer grades are not utilized for this audit, but depending on your program, may be utilized for establishing your major/minor GPA. Any future course schedules are subject to change until offically released.

Legend

☑ Complete	Complete except for classes in-progress	(T) Transfer Class
☐ Not Complete	Nearly complete - see advisor	@ Any course number

☐ Degree in Associate of Applied Science — Academic/Catalog Yr: 2014-2015 Credits Required: 64; GPA: 3.000 Credits Applied: 44

Unmet conditions for this set of requirements: 20 C redits needed

In order to graduate with an associate's degree, all programmatic requirements must be met and a minimum of 60 credit hours must be earned.

☑ 2.0 GPA Requirement Met

☑ Freshman Seminar	FSUS 100	FSU Seminar-TE-CNS/EEET	B	1	Fall 2014
☐ General Education Requirements	Still Needed:	See General Education for Engineering Tech. section			
☐ Major Requirements	Still Needed:	See Major in Industrial Electronics Technology: EEIT section			

☐ General Education for Engineering Tech. — Academic/Catalog Yr: 2014-2015 GPA: 2.860

☑ Communication Competence					
☐ Scientific Understanding	Still Needed:	See Scientific Understanding for Engineering Tech AAS section			
☑ Quantitative Skills					
☐ Cultural Enrichment	Still Needed:	See Cultural Enrichment for Engineering Tech (AAS) section			
☑ Social Awareness					

☑ Communication Competence for Engineering Tech AAS — Academic/Catalog Yr: 2014-2015 Credits Required: 6; GPA: 3.200 Credits Applied: 6

☑ COMMUNICATION COMPETENCE

☑ English 1	ENGL 150	English 1	A-	3	Fall 2014
☑ English 2	ENGL 250	English 2	B-	3	Spring 2015

☐ Scientific Understanding for Engineering Tech AAS — Academic/Catalog Yr: 2014-2015 GPA: 0.000

Scientific Understanding course must have a lab.

1 Class is

Planner Worksheet AB72APhB as of 06/19/2015 at 08:56 Print

Student		**Level**	Undergraduate
ID		**Degree**	Associate in Applied Science - AAS
Classification	Sophomore	**College**	College Engineering Technology
Advisor	Klope, Warren A	**Major**	Industrial Electronics Tech. - EEIT
Overall GPA	3.000	**Minor**	

Degree in Associate of Applied Science

Unmet conditions 20 Credits needed

In order to graduate with an associate's degree, all programmatic requirements must be met and a minimum of 60 credit hours must be earned.

- [x] 2.0 GPA Requirement Met
- [x] Freshman Seminar

FSUS 100	FSU Seminar-TE-CNS/EEET	B	1	Fall 2014

- [ ] General Education Requirements

Needed: See **General Education for Engineering Tech.** section

- [ ] Major Requirements

Needed: See **Major in Industrial Electronics Technology EEIT** section

General Education for Engineering Tech.

- [x] Communication Competence
- [ ] Scientific Understanding

Needed: See **Scientific Understanding for Engineering Tech AAS** section

- [x] Quantitative Skills
- [ ] Cultural Enrichment

Needed: See **Cultural Enrichment for Engineering Tech (AAS)** section

- [x] Social Awareness

Communication Competence for Engineering Tech AAS

- [x] COMMUNICATION COMPETENCE
  - [x] English 1

ENGL 150	English 1	A-	3	Fall 2014

  - [x] English 2

ENGL 250	English 2	B-	3	Spring 2015

Scientific Understanding for Engineering Tech AAS

Scientific Understanding course must have a lab.

- [ ] Introductory Physics

MyDegree

FERRIS STATE UNIVERSITY *IMAGINE MORE* MyDegree

Student View AB72APhA as of 06/19/2015 at 08:54

Student		Level	Undergraduate
ID		Degree	Associate in Applied Science - AAS
Classification	Junior	College	College Engineering Technology
Advisor	Klope, Warren A	Major	Industrial Electronics Tech. - EET
Overall GPA	3.290	Minor	

Disclaimer

You are encouraged to use this degree audit report as a guide when planning your progress toward completion of degree requirements. Your academic advisor may be contacted for assistance in interpreting this report. This audit report is not your academic transcript and it is not official notification of completion of degree or certificate requirements. Transfer grades are not utilized for this audit, but depending on your program, may be utilized for establishing your major/minor GPA. Any future course schedules are subject to change until offically released.

Legend

☑ Complete	≈ Complete except for classes in-progress	(T) Transfer Class
☐ Not Complete	≈ Nearly complete - see advisor	@ Any course number

Degree in Associate of Applied Science — Academic/Catalog Yr: 2013-2014 — GPA: 3.290 — Credits Required: 64 — Credits Applied: 100

In order to graduate with an associate's degree, all programmatic requirements must be met and a minimum of 60 credit hours must be earned.

- ☑ 2.0 GPA Requirement Met
- ☑ Freshman Seminar — FSUS 100 — FSU Seminar-TE-CNS/EEET — A- — 1 — Fall 2013
- ≈ General Education Requirements
- ☑ Major Requirements

General Education for Engineering Tech — Academic/Catalog Yr: 2013-2014 — GPA: 3.600

- ☑ Communication Competence
- ☑ Scientific Understanding
- ☑ Quantitative Skills
- ☑ Cultural Enrichment
- ≈ Social Awareness

Communication Competence for Engineering Tech AAS — Academic/Catalog Yr: 2013-2014 — GPA: 3.650 — Credits Required: 6 — Credits Applied: 6

- ☑ COMMUNICATION COMPETENCE
  - ☑ English 1 — ENGL 150 — English 1 — A — 3 — Fall 2013
  - ☑ English 2 — ENGL 250 — English 2 — B+ — 3 — Spring 2014

Scientific Understanding for Engineering Tech AAS — Academic/Catalog Yr: 2013-2014 — GPA: 3.100

Scientific Understanding course must have a lab.

- ☑ Introductory Physics — PHYS 211 — Introductory Physics 1 — B+ — 4 — Summer 2014

Quantitative Skills for Engineering Tech AAS — Academic/Catalog Yr: 2013-2014 — GPA: 3.850

Planner Worksheet AB72APhA as of 06/19/2015 at

Print

Student		**Level**	Undergraduate
ID		**Degree**	Associate in Applied Science - AAS
Classification	Junior	**College**	College Engineering Technology
Advisor	Klope, Warren A	**Major**	Industrial Electronics Tech. - EEIT
Overall GPA	3.290	**Minor**	

Degree in Associate of Applied Science

In order to graduate with an associate's degree, all programmatic requirements must be met and a minimum of 60 credit hours must be earned.

2.0 GPA Requirement Met

Freshman Seminar

FSUS 100	FSU Seminar-TE-CNS/EEET	A-	1	Fall 2013

General Education Requirements

Major Requirements

General Education for Engineering Tech.

Communication Competence

Scientific Understanding

Quantitative Skills

Cultural Enrichment

Social Awareness

Communication Competence for Engineering Tech AAS

COMMUNICATION COMPETENCE

English 1

ENGL 150	English 1	A	3	Fall 2013

English 2

ENGL 250	English 2	B+	3	Spring 2014

Scientific Understanding for Engineering Tech AAS

Scientific Understanding course must have a lab.

Introductory Physics

PHYS 211	Introductory Physics 1	B+	4	Summer 2014

Quantitative Skills for Engineering Tech AAS

QUANTITATIVE SKILLS

Algebra & Analytical Trigonometry.

MATH 126	Algebra-Analytic Trigonometry	A	4	Spring 2014

Numerical Trigonometry

MATH 116	Intermediate Algebra-Num Trig	A-	4	Fall 2013

Cultural Enrichment for Engineering Tech (AAS)

Cultural Enrichment Requirement

GERM 100	German for Business-Travel	B+	3	Summer 2014

Social Awareness for Engineering Tech AAS

Social Awareness Requirement

GEOG 100	Geography of World Regions	IP	(3)	Summer 2015

E. Work in Lieu of Courses

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 33 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.

The second avenue is to test a student's prior work experience. This is done at the department/program level. A student meets with their advisor or a representative from the program to determine if an exam exists or if a faculty member who teaches in that area would prepare a proficiency exam. The program has a policy that this must be done prior to the start of the semester. A $25/credit hour fee is assessed the student. If the student passes, they are given credit for that course. Unlike the CLEP test, there is no re-testing available for proficiency exams in the program area. See the Course Competency Assessment and Testing Policy, Academic Affairs Polity Letter of February 27, 2006 at the end of this Criterion 1 section.

Students can also gain credit for Advanced Placement (AP) courses. A 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.

One area that a student may gain advanced placement for work or military experience is through the internship process. The program requires the EEET major to perform an internship (usually between the 3rd and 4th year). If a student comes to the program with significant work and/or military experience the department will look at each case and vote at a department meeting to grant a waiver, or not based on evidence that the student provides. This evidence is usually a letter from a previous employer or military records outlining job functions. Students who may have had a "summer job" that would have qualified, but did not enroll in the course are not granted a waiver. They must obtain an internship and enroll in the course.

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

The degree conferred upon graduates of the EET program is a Bachelor of Science in Electrical/Electronics Engineering Technology degree. The degree conferred upon graduates of the EEIT program is an Associate of Applied Science in Industrial Electronics Technology. It

should be noted that almost all (greater than 99%) of the EEIT program matriculate into EEET program. There have only been one or two in the last six years that have left after 2 years.

As indicated in sections C and D above, all students meet periodically with their advisor who monitors the student matriculation through the program. Both faculty and students have access to where the student is in the My Degree student web page. This program was implemented in the fall 2010 and all new students' records as of that semester are complete. Students and faculty have the opportunity to create "what if" scenarios to map a student's progression through the program. Faculty also maintain hard copy files on all advisees and are responsible for making sure it is up to date and correct. It is incumbent upon the student to make sure their advisor is keeping them abreast of their progress and meeting program requirements for graduation.

The EEIT program requires the student to complete 64 semester hours of coursework with no work or internship requirement to receive the associate's degree. The general education requirements for the EEIT are: six credits are for global consciousness and cultural enrichment, six for English, six for math, and three for scientific understanding (Physics).

The EEET program requires the student to complete 132 semester hours (including 64 credits completed in the EEIT and 4 credits of internship) to receive a bachelor's degree. The curriculum is discussed in more detail in subsequent sections of this report. The student must meet certain University General Education Requirements as well. To obtain a bachelor's degree from Ferris State University, the student must demonstrate competencies in communications, scientific understanding, quantitative skills, cultural enrichment, social awareness, global consciousness, and race/ethnicity/gender issues. The criteria are given as follows:

- The communications requirement involves completing nine credit hours of English composition and 3 credits of speech communication.
- The scientific understanding requirement is 7 hours of course work, at least one course having a laboratory component. This criteria is met within the program with the following courses: PHYS 211, PHYS 212, and CHEM 114.
- Quantitative skill pertains to Mathematics skills. The program meets the criteria with MATH 115, MATH 120, MATH 130, MATH 220 and MATH 230.
- Graduates are required to complete 9 hours of cultural enrichment courses. One must be at the 200-level or higher.
- Graduates are required to take 9 hours of social awareness courses. One must be a Foundations Course and one must be at the 200-level or higher.
- Finally, a graduate must complete one course that meets the global consciousness requirement and another course that meets the requirements for race/ethnicity/gender issued. These can be courses that also meet cultural enrichment, social awareness, or other curricular requirements.

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. They 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 checks to make sure all criteria have been met. A copy of the audit findings are then sent to both the student and the advisor. In recent years, since the introduction of MyDegree, the student completes an online audit request

(and up until 2015 a duplicate written request). The advisor and student both go over the MyDegree page and sign-off on the degree audit before it is sent to the Dean's Office for verification. Notice is then sent to the student and advisor as to what, if anything, needs to be addressed prior to graduation.

G. Transcripts of Recent Graduates

As mentioned above, there are two concentrations a student may choose from, Digital and Automation; however, there is no mandate that a student must complete one OR the other. The student is free to choose the "Concentration Electives" they desire. Hence the name, elective. An example would be a student that started in the Automation Concentration and discovered they were more interested in Digital Concentration. They have already taken Industrial Power and Machines and the advanced PLC programming class. They then decide to take Advanced Digital I and II for their final two electives. This is perfectly acceptable as is going the other way by starting in Advanced Digital I and/or II and switching to the Automation Concentration. All of the elective courses meet the rigor of upper level Technology courses and are numbered as such (300 and 400 designators).

This is not shown on the transcripts and the Degree conferred is a Bachelor of Science in Electrical/Electronics Engineering Technology, no concentration listed in either case. The AAS degree does not have any options. All courses in the Check Sheet/MyDegree must be completed as listed. See Check sheet below.

FERRIS STATE UNIVERSITY
Imagine More

ASSOCIATE IN APPLIED SCIENCE
Industrial Electronics Technology
BACHELOR OF SCIENCE
Electrical/Electronics Engineering Technology
Program Academic Requirements

Student:				Transfer Credits:	
Advisor:		Ph:		GPA Degree:	

ASSOCIATE DEGREE REQUIREMENTS

MAJOR			CR	GR
EEET	111	Mobile Robots	1	
EEET	114	Electric Circuits 1 (MATH 116 Coreq)	4	
EEET	122	Digital 1 (C- in EEET 114)	4	
EEET	124	Electric Circuits 2 (C- in EEET 114, MATH 116 or ACT 24)	4	
EEET	210	Communication Circuits (C- in EEET 124, Coreq EEET 211/212)	3	
EEET	211	Electronics (C- in EEET 124)	3	
EEET	212	Digital 2 (C- in EEET 122)	4	
EEET	214	Advanced Electric Circuits (C- in EEET 124, MATH 126 or 216)	3	
EEET	221	Troubleshooting (C- in EEET 210/211/212)	3	
EEET	222	Microprocessor Applications (C- in EEET 212)	4	
EEET	224	Industrial Automation and Motors (C- in EEET 214)	4	
EEET	325	PC Data Acquisition and Control (C- in EEET 122 & EEET 124 or Dept. Approval)	3	
COMMUNICATIONS COMPETENCE				
ENGL	150	English 1 (ACT 14 or ENGL 074)	3	
ENGL	250	English 2 (C- in ENGL 150)	3	
SCIENTIFIC UNDERSTANDING				
PHYS	211	Physics 1 (C- in MATH 116/120 or ACT 26)	4	
QUANTITATIVE SKILLS				
MATH	116	Intermediate Algebra (ACT 19 or C- in MATH 110)	4	
MATH	126	Algebra & Analytical Trig. (ACT 24 or C- in MATH 116)	4	
CULTURAL ENRICHMENT				
		Cultural Enrichment Elective	3	
SOCIAL AWARENESS				
		Social Awareness Elective	3	
FRESHMAN SEMINAR				
FSUS	100	FSU Seminar	1	
TOTAL CREDITS IN AAS MAJOR			**40**	
TOTAL CREDITS IN AAS DEGREE			**65**	

BACHELOR OF SCIENCE GENERAL EDUCATION REQUIREMENTS:

(1) Race-Ethnicity-Gender Course (3 credits) *

(1) Foundation Course (3 credits)*

(1) Global Consciousness Course (3) credits*

*Multiple requirements may be satisfied by a single course

Social Awareness-(9) credits (3 credits in 200 level or above and (3) credits as social foundation course)

Cultural Enrichment-(9) creduits required (3 credits in 200 level or above)

NOTE: A minimum grade of C- is required for any EEET or ECNS course to qualify as a prerequisite for another EEET or ECNS course

BACHELOR DEGREE REQUIREMENTS

MAJOR			CR	GR
ECNS	311	High Level Programming (MATH 116 or higher)	3	
EEET	321	Network Analysis (C- in EEET 124, MATH 226)	3	
EEET	393	Internship (Department Permission)	4	
EEET	418	Project Management (Department Permission)	2	
EEET	428	Senior Projects (C- in EEET 418)	2	
Concentration Electives 1-4			16	
CAD Elective -ETEC 140 Engr Graphics or Approved Alternative			3	
Technical Science Electives			4	
Directed Elect-MFGE 423 Engr Economics or Approved Alternative			2	
TECHNICAL SCIENCE ELECTIVES (4 credits required)				
MECH	250	Fluid Power (MATH 116 or ACT 24)	2	
MECH	211	Fluid Mechanics (PHYS 211/241, MATH 126)	4	
MECH	223	Thermodynamics (MATH 216/220, PHYS 211)	3	
MECH	340	Statics/Strengths-Matls (MATH 126, PHYS 211)	4	
MFGE	353	Statistical Quality Control (MATH 115/116 or ACT 24)	3	
MFGE	341	Quality Science Stats (MATH 116/120/126 or ACT 24)	3	
MFGE	342	Statistical Process Engr (MFGE 341)	3	
PDET	413	Appl Fluid-Thermo (MATH 116 or ACT 24, MECH 340)	3	
COMMUNICATIONS COMPETENCE				
ENGL	311	Adv Technical Writing (C in ENGL 250/211)	3	
COMM	121	Fundamentals of Public Speaking	3	
QUANTITATIVE SKILLS				
MATH	216	Applied Calculus (C- in MATH 126/130 or ACT 26)	4	
MATH	226	Fourier Series & Appl. Diff. Equ. (C- in MATH 216)	4	
SCIENTIFIC UNDERSTANDING				
PHYS	212	Physics 2 [CHEM 114 Alt] (C- in PHYS 211)	4	
CULTURAL ENRICHMENT				
		Cultural Enrichment Elective	3	
		Cultural Enrichment Elective (200 level or above)	3	
SOCIAL AWARENESS				
		Social Awareness Elective	3	
		Social Awareness Elective (200 level or above)	3	
CONCENTRATION COURSES (16 credits required)				
ECNS	315	Network Theory and Test (C- in ECNS 225)	3	
ECNS	323	Real Time Operating Systems (C- in ECNS 311)	4	
ECNS	414	Adv. Digital Systems (C- in EEET 222 & ECNS 311)	4	
ECNS	424	Advanced Digital Design (C- in ECNS 311 & ECNS 414)	4	
EEET	313	Electrical Power & Machines (C- in EEET 224 or EEET 301)	4	
EEET	323	Ind. Automation Controls (C- in EEET 224 or EEET 301)	4	
EEET	357	Advanced Electronics (C- in EEET 211 & EEET 222)	3	
EEET	414	Ind. Process Comm. (C- in EEET 323)	4	
EEET	424	Ind. Motion Control (C- in EEET 313 & EEET 321)	4	
TOTAL CREDITS IN BS MAJOR			**39**	
TOTAL CREDITS IN BS DEGREE (incl. AAS Degree Credits)			**134**	

For More Information, contact the Electrical/ Electronics Engineering Technology Program
Phone: 231-591-2755
Email: eecn@ferris.edu www.ferris.edu/eet

Fall 2014
10/23/14

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statements

University Mission Statement (as found at http://www.ferris.edu/):

> 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 (as found at http://www.ferris.edu/cet):

> 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.

EEET & CNS Department Mission Statement (as found at http://www.ferris.edu/eet):

> Provide students instruction so that they become knowledgeable, skilled and responsible people in the areas of automation, computer-based systems, networks or electronics where employment is a realistic probability both now and in the future.

B. Program Educational Objectives

The educational objectives of the EEET program graduate are (as found at http://www.ferris.edu/eet)

1. Employment in a discipline appropriate to the degree.
2. Achieve recognition as a valued employee through varied forms of promotion or merit.
3. Demonstrate high standards of ethical and social values.
4. Ability and desire to continue education through varied means including advanced degrees.

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

The educational objectives of the program are consistent with the mission of the university in the following ways:

- Employment in a discipline appropriate to the degree maps well to a career-oriented education.
- Achieve recognition as a valued employee maps well to having a successful career.
- Demonstrating a high standard of ethical and social values maps to being a responsible citizen in a global society.
- The ability and desire to continue education maps very well to lifelong learning.

Assessing the value of the EEET program can be qualified with the following perspectives:

- Value to Ferris State University.

- Value with respect to employers of our graduates.
- Value to students in this program.

The quantification of value to the mission of Ferris State University in the area of EEET is evident in several facets. The programs have received grants from the National Science Foundation (NSF) recently. In addition to the STEM grants, several faculty members have received FSU's Exceptional Merit Grants as well as Timme Funding (Internal FSU Travel Funding) for conference travel.

D. Program Constituencies

The constituencies of the program include the companies that employ our graduates, the industrial advisors that work with the program on improvements, the graduates of the program, community colleges that provide transfer students into the program and internship sites that employ summer interns on an annual basis. Many of the intern sites employ graduates of the program. Prospective employers seek out FSU's EEET graduates because of their reputation for having solid fundamentals. This is reflected in both graduate hiring, as well as internship opportunities.

With statistics of nearly 100% graduate placement, the program's outside influences go beyond hiring. The department has hosted ten different companies in "Connect with Industry" colloquial conferences on an ongoing basis in the department for the benefit of the program's current student body. Many of these companies request campus visits for such meetings.

The EEET program has industry advisors which comprise an advisory board that assists in directing the program's curriculum and outcomes. The input from the advisory board is a great asset, as it allows the programs to adapt to changing conditions in industry, technology and the graduate environment. Advisors on the board are all volunteers from regional industries, many of which are strong supporters of the program and employers of EEET graduates. The continued support of the advisory board is a clear indication of the strengths, value and visibility of the EEET program.

E. Process for Review of the Program Educational Objectives

The involvement of the various constituencies is not the same because of their knowledge, experience, proximity, and availability. The program seeks input from the advisory committee members at least twice a year. The input from faculty is continual. The faculty group meets at least once a month. The relevancy and importance of the program and how the program may be improved is discussed whenever there is a new development in the profession. Formal and informal input from students as they take various courses is taken into account. However, the input from the employers and alumni is sought through the surveys the program conducts. The faculty and students also meet the employers and alumni annually at the Michigan Society of Professional Surveyors conference held in different parts of Michigan. The faculty also attend the national level conferences as well several state level conferences where input from alumni and employers is sought informally.

The program has adopted a process whereby we seek input via formal surveys and informal input; when there is sufficient input; then new objectives are developed. These are first discussed by the faculty group. Once the faculty group approves them, they are taken to the advisory committee meetings to examine and discuss each objective and how it is relevant to the program. The program objectives are changed upon approval of the advisory committee.

The step-by-step process for upgrading the Program Educational Objectives is as follows:

1. Seek input from the constituencies (refer to Table 2.1 for the kind of input and frequency of input); the level of involvement of each constituency and their responsibilities varies according to their role and importance. Obviously, faculty and the advisory committee will have a greater role than students.
2. The faculty in the program analyze and debate each suggestion and its relevance to the program educational objectives keeping in mind the requirements imposed by the state licensing board, general education requirements of the university, the ABET requirements, plus the developments in new technologies.
3. Once the faculty feel that the changes are required as a result of the input from the constituencies or changes from the licensing board or ABET, the required changes are made by the program faculty. These are then discussed and debated in the advisory committee meeting.
4. It is a continual and cyclical process and does not really end as indicated in Figure 2.1

If the faculty decide to change the courses or curriculum as a result of the input from the constituencies, then the proposed changes as shown in figure 2.1 are made by the faculty group. These changes are then taken to the advisory committee meeting. The changes are adopted upon approval by the advisory committee.

Figure 2.1: Program Educational Objectives Change Cycle

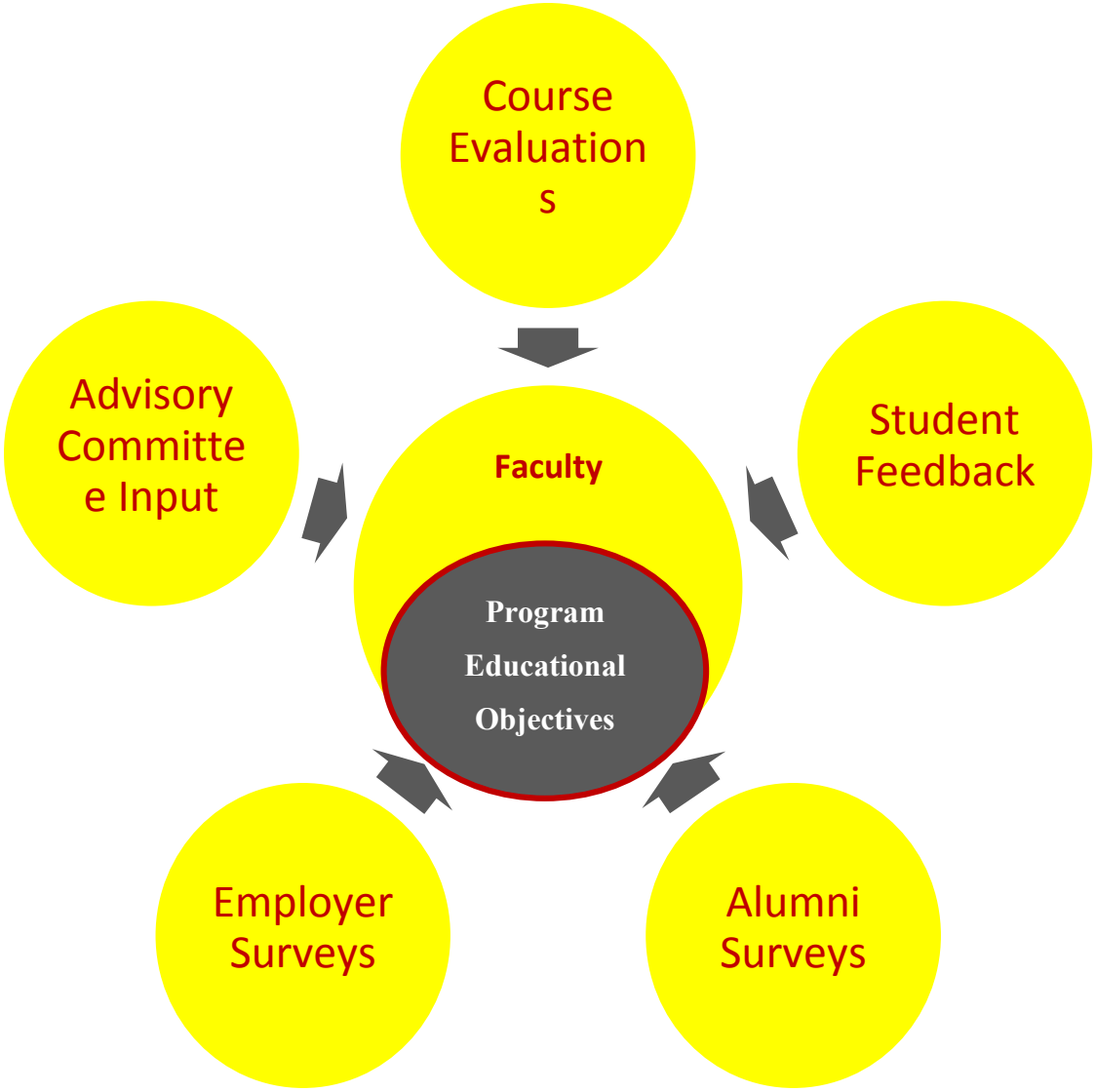


Table 2.1 Frequency of Constituency Surveys

Constituency	Indicator	Frequency
Students	Class discussion and student surveys Student assessment of instruction Student transcripts	Periodically Each semester Each semester
Faculty	Monthly meetings Meeting with administration Faculty Survey	Monthly Periodically Periodically
Advisory Committee	Formal input during Fall Semester meeting Informal input Advisory Committee surveys	Annually Continual Annually
Alumni	Informal input Alumni Survey	Continual Periodically
Employers	Employer Survey Informal input	Periodically Continual

CRITERION 3. STUDENT OUTCOMES

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

The process for establishment and revision of student outcomes is complicated and is best illustrated in Criterion 4 B Continuous Improvement, The Advisory Meeting Minutes, and the EEIT and EEET Department Meeting Minutes. The process takes into account the university policy, University Curriculum Committee requirements, university Academic Program Review Council (a regulatory arm of the university Senate), and ABET criteria. The full process will be available to the visiting team in October in the form of flow charts, minutes and policies (most of which may be found elsewhere in this document). A summary is also shown in Table 3 – 1 below.

B. Student Outcomes

Each program student will demonstrate before graduation:

a) An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.
b) An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology.
c) An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.
d) An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.
e) An ability to function effectively on teams.
f) An ability to identify, analyze and solve technical problems.
g) An ability to communicate effectively.
h) Recognition of the need for, and an ability to engage in, lifelong learning.
i) An ability to understand professional, ethical and social responsibilities.
j) A respect for diversity and knowledge of contemporary professional, socEEITal and global issues.
k) A commitment to quality, timeliness, and continuous improvement.

C. Relationship of Student Outcomes to Program Educational Objectives

The Program Educational Objectives associated with the Electrical/Electronics Engineering Technology program are as follows:

1. Employment in a discipline appropriate to the degree.
2. Achieve recognition as a valued employee through varied forms of promotion or merit.
3. Demonstrate high standards of ethical and social values.
4. Ability and desire to continue education through varied means including advanced degrees.

A graphic representation between Student Outcomes and Program Educational Objectives may be found on Chart 3-1.

Chart 3-1: Relationship Between Student Outcomes and Program Objectives

Program Outcomes	Employment in a discipline appropriate to the degree	Achieve recognition as a valued employee through varied forms of promotion or merit	Demonstrate high standard of ethical and social values	Continue education through varied means including advanced degrees
a) An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines	X	X		X
b) An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology	X	X	X	X
c) An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes	X	X		X
d) An ability to apply creativity in the design of systems, components or processes appropriate to program objectives	X	X	X	X
e) An ability to function effectively on teams	X	X	X	X
f) An ability to identify, analyze and solve technical problems	X	X		X
g) An ability to communicate effectively.	X	X	X	X
h) Recognition of the need for, and an ability to engage in lifelong learning		X		X
i) An ability understand professional, ethical and social responsibilities		X	X	X
j) A respect for diversity and knowledge of contemporary professional, societal and global issues			X	X
k) A commitment to quality, timeliness, and continuous improvement		X		X

PROGRAM OUTCOMES AND ASSESSMENTS MAPPED TO EACH COURSE

I= Outcomes Introduced
R = Outcomes Reinforced
M = Outcomes Mastered
A = Assessment Courses

TAC-ABET OUTCOME CRITERIA → / COURSES	a	b	c	d	e	f	g	h	i	j	k	EVALUATION INSTRUMENT →	Course Grade	Lab Performance	Portfolio	Report,, Presentations	Project, Results	Advisor Survey/Meeting Feedback	Student Assessment	Instructor Input	Employer Survey	Graduate Survey
EEET 111 Mobile Robots	I	I	I		I	I	I				I		x	x		x		x	x	x		x
EEET 114 Electric Circuits 1	I	I	I		I	I	I				I		x	x				x	x	x		x
EEET 122 Digital 1	I	I	I	I	I	I	I				I		x	x				x	x	x		x
EEET 124 Electric Circuits 2	I	I	I	I	I	I	I				I		x	x				x	x	x		x
EEET 210 Communications	R	R	R	R	R	R	R				R		x	x				x	x	x		x
EEET 211 Electronics 2	R	R	R	R	R	R	R				R		x	x		x		x	x	x		x
EEET 212 Digital 2	R	R	R	R	R	R	R				R		x	x				x	x	x		x
EEET 214 Advanced elect ckts	R	R	R	R	R	R	R				R		x	x				x	x	x		x
EEET 221 Troubleshooting	R	R	R	R	R	R	R				R		x	x		x		x	x	x		x
EEET 222 Microprocessor Appl.	R		R	R	R	R	R				R		x	x	x	x	x	x	x	x		x
EEET 224 Ind. Automation & Motors	R		R	R	R	R	R				R		x	x				x	x	x		x
ECNS 311 High Level Programming	R			R		R					R		x	x		x		x	x	x		x
EEET 325 PC Data Acq. and Control	R		R	R	R	R	R				R		x	x			x	x	x	x		x
EEET 321 Network Analysis	M			M		M					M		x					x	x	x		x
EEET 313 Elect. Power & Machines	R	R	R	R	R	R	R	R			R		x	x		x		x	x	x		x
	R	R	R	R	R	R	R	R			R		x	x	x			x	x	x		x

EEET 323 Ind. Automation Controls																					
EEET 357 Advanced Electronics																					
EEET 393 Internship	R A	R A	R A	R A	R A	R A	R A	R A	R A	R A	R A		x			x		x	x	x	x	x
ECNS 414 Advanced Digital Systems																					
ECNS 424 Advanced Digital Design																					
EEET 414 Ind. Process Comm.	M A	M A	M A	M A	M A	M A	M A	M A			M A		x	x				x	x	x		x
EEET 418 Project Management	M A	M A	M A	M A	M A	M A	M A	M A	M A	M A	M A		x					x	x	x		x
EEET 424 Motion Control	M A	M A	M A	M A	M A	M A	M A	M A			M A		x	x				x	x	x		x
EEET 428 Senior Project	M A	M A	M A	M A	M A	M A	M A	M A	M A	M A	M A		x	x		x	x	x	x	x		x
MATH 116 Int. Algebra/Trig. MATH 126 Algebra/Anal. Trig.	I	I				I					I		x									x
MATH 216 Applied Calculus	R	R				R					R											x
MATH 226 Fourier Trans/ Different Eq.	R	R A				R					R											x
COMM 121 FUNDAMENTALS OF PUBLIC SPEAKING							R															
ENGL 150 ENGLISH 1							I															
ENGL 250 ENGLISH 2							R															
ENGL 311 ADVANCED TECHNICAL WRITING							R A															
PHYS 211-Physics 1 PHYS 212-Physics 2		R				R					R		x	x								x
Technical Science Course Directive Elective Course(s)		R	R			R		R			R		x									x
ECNS 315 NETWORK THEORY & TEST																						
ECNS 323 IND AUTO CONTROLS	R	R	R	R	R	R	R															
	I	I	I			I	I						x	x		x		x	x	x		x

ETEC 140 ENGINEERING GRAPHICS																					
MECH 250 FLUID POWER	I	I	I	I	I	I	I						x	x		x		x	x	x		x
MECH 211 FLUID MECHANICS	I	I	I	I	I	I	I						x	x		x		x	x	x		x
MECH 223 THERMODYNAMICS	I	I	I	I	I	I	I						x	x		x		x	x	x		x
MECH 340 STATICS & STRENGTHS	R	R	R	R	R	R	R						x	x		x		x	x	x		x
MFGE 353 STATISTICAL QUALITY	R	R	R	R	R	R	R						x	x		x		x	x	x		x
MFGE 341 QUALITY SCIENCE STATISTICS	R	R	R	R	R	R	R						x	x		x		x	x	x		x
MFGE 342 STATISTICAL PROCESS ENGINEERING	R	R	R	R	R	R	R						x	x		x		x	x	x		x
PDET 413 APPLIED FLUID THERMODYNAMICS	R	R	R	R	R	R	R						x	x		x		x	x	x		x
MFGE 423 ENGINEERING ECONOMICS	R	R	R	R	R	R	R						x	x		x		x	x	x		x

CRITERION 4. CONTINUOUS IMPROVEMENT

A. Overview

The Continuous Improvement Process (CIP) implemented by the Electrical/Electronics Engineering technology Program in the College of Engineering Technology (CET) at Ferris State University (FSU) is comprised of Program Educational Objectives (PEOs), Program Outcomes (POs), assessment tools and feedback methodologies. Figure 1 depicts the overall flowchart of the EET Program Continuous Improvement Process.

The EEET program has two primary inputs which define its objectives and outcomes. These are the EEET Industrial Advisory Board and the missions of both Ferris State University and the College of Engineering Technology. In addition, the EEET program uses feedback from its assessment and evaluation assets to "close the loop" providing a means of regulating and refining the program's objectives and outcomes.

The Industrial Advisory Board (IAB) consists of industry leaders, many of which are graduates of the EEET program at Ferris State University. The input from the Industrial Advisory Board is invaluable to keeping the EEET program's objectives and outcomes relevant and up to date. The Industrial Advisory Board meets annually to assess the EEET program's goals, progress as well as to advise the program on industry trends and needs. Minutes of the Industrial Advisory Board meetings are kept and used to document changes to the EEET program.

Assessment and evaluation are distilled from three major areas to facilitate a relevant and focused feedback in the continuous improvement process (CIP). An annual faculty retreat is held before the fall semester to analyze data gathered from the previous year and to implement changes to the EET program. The fall retreat meeting minutes are documented for feedback and retention purposes. In addition, faculty can contribute to the assessment process by reporting findings from individual Faculty Course Assessment Reports (FCARs). The graduates of the EEET program are also given surveys for evaluation purposes. All of these tools are rendered to help provide accurate feedback to foster positive changes to the curriculum and the overall program.

Figure 1
Flowchart of EET Program
Continuous Improvement Process

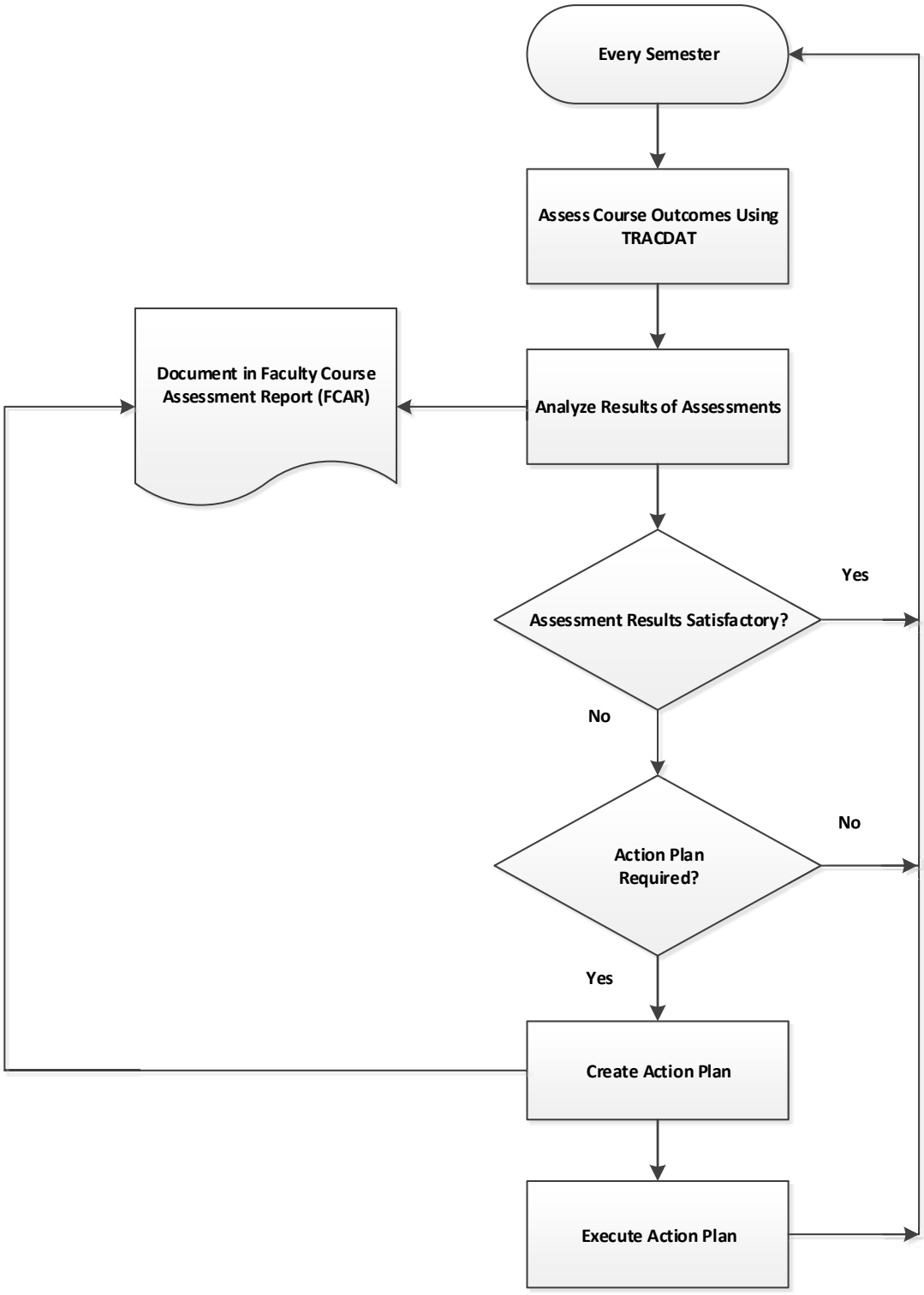


Figure 2
Flowchart of Individual Faculty
Continuous Improvement Process

B. Student Outcomes

The EEET program maintains several student outcome processes. The primary driver to student outcomes on a course by course level is TRACDAT. TRACDAT is a software program that tracks student outcomes on a semester basis. The EEET faculty summarizes outcomes every semester to track progress using this tool. This input is critical to accurate faculty assessment using the FCARs (see Figure 2). The assessments using TRACDAT are not only presented in the FCAR, but are available as a hard copy report.

The Industrial Advisory Board is a critical path element in student outcomes as well. This board meets annually to discuss the program's goals and to direct its future outcomes based on industry needs and direction. Many of the Industrial Advisory Board members are graduates of the EEET program and have a vested interest in the success of the EEET curriculum. The meeting minutes of this board are maintained by the department and are used for documentation and retention purposes. Many of the industrial advisory board members are also present for the capstone senior project presentations given at the end of the spring semester.

Senior projects are a capstone course that encompasses a first semester project management course integrated with a senior project course which culminates in an oral and written presentation to the faculty, guests and industrial advisory board. This course brings together all aspects of the EEET program to fruition. In addition, the students that present their senior project are evaluated in accordance to ABET criteria, which is an excellent marker for the program's overall effectiveness.

C. Continuous Improvement

The Continuous Improvement Process (CIP) has been used in specific circumstances that are reflected and summarized in both the faculty retreat minutes as well as the industrial advisory board minutes. Both of these annual meetings address the PEOs and POs of the EEET program in their respective manners. Re-assessment of PEOs and POs are a culmination of the feedback that is brought to the program as depicted in Figure 1.

Faculty use FCARs to assess each course at the end of the semester. The FCAR itself is a means to reflect on the course's effectiveness, compare to previous semesters, and to provide a feedback loop to continuously improve the course. Although these FCARs are not individually reviewed by other faculty, they can be a means to bring to attention needs in the program and are a part of the program's continuous improvement loop (see Figure 2).

The following continuous improvement initiatives for the program were reviewed at the faculty retreat, which as shown in Figure 1, come from a several inputs.

- Discussed combining FSUS 100 and EEET 111 by building a project in the five weeks available. Drop EEET 111 from the curriculum and catalog effective next fall. All in favor. Sandy will start the curriculum proposal.
- Warren Klope feels it's important to redo the course descriptions for EEET 114, 124, and 214 to reflect more current technology and content. Sandy will do the curriculum proposal if Warren sends her the revised course catalog descriptions.

- MECH 250 – all faculty want to know how many EEET/EEIT students take this course. Sandy will check into that.

- MECH 341 – add to block schedule – does it fit? Would that overload the sections already? Sandy will check into this.

- MATH 226 – discussed removing this course from curriculum as students are not being taught the course content. This has been an issue for several years. If we do this, then we can remove EEET 321 and 424 from the check sheet; OR remove EEET 321 and offer 424 in a different format.

- EEET 300 – blend EEET 424, MATH 226 and have EEET 313 as a prereq.

- EEET 321 – drop it – EEET 424 could pick up content, but it needs LABVIEW and Automation Studio.

- Change MATH 216 and 226 to MATH 220 and 230, add EEET 300, and drop EEET 321

- How are our students informed about FSU? Word of mouth, school counselors, visit schools

- What can we do to recruit more? Hold one day camps for kids and their parents? No overnighter to keep cost down, but would probably recruit closer to home. If we hold camps more than one day, we would draw more from longer distance.

The continuous improvement process has provided the impetus to update the EEET program's check sheet to reflect a more current and relevant math curriculum starting in the Fall of 2015. The program has been updated to utilize standard math courses in contrast to the application specific math courses that students had been required to take. This change provides students with more flexible scheduling, more direct transferability, and the ability to apply these courses to graduate work if such opportunities present themselves.

D. Additional Information

Additional information is available in the individual course binders which highlight specific rubrics, examples and FCARs. In addition, a sampling of both annual faculty retreat minutes and industrial advisory board minutes are available below for review.

EET & CNS RETREAT MINUTES

Wednesday, August 24, 2011

Present: Keith Jewett, Gary Todd, Ron Mehringer, Murry Stocking, Luiz Costa, Warren Klope, Bob Most, Sandy Kerridge, Debbie Dawson, Steve Johnson

Lab Updates and Equipment Purchases

Steve provided an update on what he did over the summer to improve the lab environment and what equipment he purchased

Articulation Agreements and Transfer Guides

· Murry reviewed what he's been working on with voc-tec centers and community colleges; he's waiting on Bill Potter to provide some documentation
· Ron indicated that he'd like to get the curriculum proposal completed before we revamp the transfer guides

Receiving Credit for EEET Courses

· Pertains to EEET 114 and EEET 124, as well as EEET 122
· Must take proficiency test, such as final exam and lab practicum
· Standard university proficiency test fee applies

Nigeria/TVTC Course Equivalencies

· Murry is asking the faculty to stop in the office and review the course descriptions, especially the upper level courses – to be done by the next program meeting
· all to review Ibadan transfer guide by next program meeting and let him know if they are in concurrence with his findings – to be done by the next program meeting

Multimeters

· Murry suggested that the multimeter be included in the tool kit; that brought up a discussion that the tool kit needs to be reviewed and updated. Multimeters can be purchased from Harbor Freight or multimeterwarehouse.com
· Sandy was asked to send out the tool kit list to everyone for their review and input as to what is necessary for what course(s) and what can be removed

ABET Response

Debbie – regarding program objectives, we're not using graduate information and showing how the information tracks to outcomes; need to close the loop; wont' get official response until after July 2012.

Internship and Senior Projects Course Waivers

Warren has two international students who would like to receive internship credit for working in the petroleum industry and they also want senior projects credit; all agreed that the senior projects course will NOT be waived for any student; for the internship course, if the student can provide documentation, it will be considered.

Student Learning and Retention Research

Luiz explained the research project he's involved with on student learning and retention issues.

Department Calendar

Ron revitalized the department calendar, sent out emails to the faculty with instructions on how to get access and create a shortcut. All can now view current events and can ask Sandy to post pertinent activities for all to see

Enrollment Numbers

· A Major Issue! Need to work on improving and retaining! Ron showed spreadsheets indicating declining numbers for both the EEET and CNS programs
· The question as raised: those who failed, what is their background, Math level and are their ACT scores weak?
· All agreed that it's easier and more concrete to work with community colleges and their articulation agreements; harder to recruit high school students

Internship Course for Summer 2012

Per summer rotation, who is willing to take on this course? Ron Mehringer wants to do it again; all declined summer schedule and agreed that Ron should be the coordinator.

Recruiting Efforts

· Need to have something to show – maybe some type of permanent display(s) – **WOW FACTOR**!

  o Debbie has funding to help with this

  o Bob's scrolling display and the robot would work out well, as well as some senior projects

  o Will discuss further at future meetings
· Need to get a list of employers where grads work

- Giveaways –

  - memory sticks at ipromo.com and add data; 4GB is sufficient; add our logo on two sides; for 500, cost is $7.00/each

  - Pick that Bob Most has – Bulldog on one side and "Ferris Rocks" on the other

- We all viewed Bob Most's EEET 412 YouTube video

- Who do we visit?

- What do we show?

- It was suggested that we take a company such as GENTEX and go visit – GENTEX can s how their video, then we come in to tell how they get there
- How about summer camps?
- WOW Factor on web site – need to create

MEETING CONTINUES ON THURSDAY, 8/25/11

Thursday, August 25, 2011

Present: Keith Jewett, Gary Todd, Ron Mehringer, Murry Stocking, Luiz Costa, Warren Klope, Bob Most, Sandy Kerridge

Financial Aid Satisfactory Academic Progress Change were reviewed; new policy attached

Dates to Remember:

8/26 - Ice Mountain coming to Ferris; Gary Todd will show them the labs and discuss our programs
9/01 – Founders Day
9/13 - CET Picnic
9/16 – GrrCON Conference
10/21 - Advisory Board Meeting

Second Tuesday of each month – School Meetings

Third Tuesday of each month - EECN monthly program meetings

Connect with Industry

Keith has some contacts he will follow up on

Everyone needs to get involved and get companies to come visit with our students

Textbook for EEET 114/124

Textbook may not be available in future; Ron to investigate

Curriculum Discussion

- Ron presented the check sheets for Purdue – their "old" and "new;" reviewed and compared to our check sheet and program courses throughout discussion
- SURE 331 – is it still a Cultural Enrichment Course? Will investigate
- All agreed to keep MATH 116 as entry level math requirement
- Discussion ensued regarding combining FSUS 100 and EEET 111 and add ethics content; some liked and some opposed the idea
- It was requested that MATH 226 be a pre-req to EEET 321 or a "stats" class; if we no longer require Math 226, then have MATH 216 or 220 as pre-req?
- Discussed replacing MATH 226 with STQM 260 (3); sequence would then be Math 216 or 220 plus STQM 260
- Luiz said he would like CPSC 130 as a pre-req to ECNS 311; CPSC 130 is (4) credit class

- Basic Skills Required
  - Electronics
  - Digital
  - Programming
  - Computer Skills
  - Troubleshooting
  - CAD
  - Introduction to Automation/Motors
  - Introduction to Systems

- Basic Courses
  - EEET-110 (2)
  - EEET-114 (4)
  - EEET-124 (4)
  - EEET-122 (4)
  - EEET-212 (4)
  - ETEC-140 (3)

- Fundamental Courses

  - EEET-210 (3)
  - EEET-211 (3)
  - EEET-214 (3)
  - EEET-221 (3)
  - EEET-224 (4)
  - EEET-393 (4)

- EEET-418 (2)
- EEET-428 (2)

· Where

- EEET-390 (3)

Technical Specialty

· Embedded Systems/Digital - CNS

- EEET-222 (4)
- ECNS-311 (3) – look at curriculum to make it better fit as pre-req to EEET 412
- EEET-412 (4)
- EEET-422 (4)

· Automation

- EEET-313 (4)
- EEET-323 (4)
- EEET-414 (4)
- EEET-424 (4)

· Communications (not currently offered)

- EEET-411 (4)
- EEET-421 (4)

· Controls Systems

- MECH-250 (2) (Added by RAM)
- ECNS-322 (3) – Change to EEET Designator
- EEET-321 (3-.4) – Increase Credits to drop MATH-226
- EEET-424 (4)

· Programming

- CNS
  - ❖ EEET-222 (4) - Required
  - ❖ ECNS-311 (3) - Required
- EEET
  - ❖ EEET-222 (4) OR ECNS-322 (3) OR ECNS-311 (3)

· Math Requirements

- MATH-116 (4)
- MATH-126 (4)
- MATH-216 (4)
- OR
- MATH-120 (4)
- MATH-130 (4)
- MATH-220 (5)
- AND
- MATH-226 (4) OR STQM-260 (3) OR MATH-230 (5)

· General Education Requirements

- 18 Credit Hours (6 three-credit courses)

· Science Understanding Requirements

- PHYS-211 (4)
- PHYS-212 (4) OR CHEM-?

· English Requirements

- ENGL-150 (3)
- ENGL-250 (3)
- COMM-121 (3)
- ENGL-311 (3)

· University Seminar

- FSUS-100 (To be included into EEET-100)

· Question was raised: should we combine 122, 212, and 222? 222 is full semester without combining other course content, so all agreed not to do so

· AutoCAD – industry standard for ETEC 140, per internship employers

· EEET 122 and 212 are (4) credits each; discussed reducing credits to (3) each; will continue discussion at next meeting

· Sandy will confirm when the last UCC meeting is so we get our curriculum proposal submitted on time to be reviewed at UCC before the spring semester ends

EET & CNS RETREAT MINUTES
Thursday, August 23, 2012

Present: Debbie Dawson, Keith Jewett, Steve Johnson, Ron Mehringer, Bob Most, Murry Stocking, Gary Todd

CONTINUOUS IMPROVEMENT PLAN

All faculty reviewed the program weaknesses found by ABET at their last visit and our response. Comments:

- All agreed that we'll continue to require our seniors to complete a survey toward the end of their EEET 428 Senior Projects Course
- Some modifications to the current survey are needed; to be enhanced
- The Internship Coordinator will provide a summary of the employer evaluations to all faculty for their review and include in the next ABET report.
- Reviewed the frequency of surveys as referenced in our Continuous Improvement Plan: advisors/employers-annually, alumni – two years out, then every five years
- All survey results are to be reviewed each year at the annual retreat to help determine improvements or changes as deemed necessary
- TracDat historical reports will be reviewed at the annual retreat to help determine the quality and measures used for our courses.

DATES TO REMEMBER

- Student Welcome Assembly – 10:00 am on Friday, 9/07/12 – include IEEE and Robotics; raffle off t-shirts and flash drives; have coffee/juice and donuts
- Annual Advisory Board Meeting – Friday, 10/05/12, day after the Career Fair
- Career Fair – Thursday, 10/04/12
- CET Picnic – 9/11/12 – Granger; Steve is in charge of the Duct Tape Challenge
- Monthly School Meetings – dates unknown at this time
- Monthly EECN Program Meetings – third Tuesday of each month; Sandy will send out invitations

FACULTY LOAD REPORT

Ron Mehringer reviewed his spreadsheet noting the class sizes and credit/contact hours for each faculty member. Some errors were found, so Ron will correct and resend to everyone.

DESCRIPTION FOR CNS FACULTY JOB POSTING

All faculty unanimously agreed that the credentials should show BS with Certifications; must get Master's degree before tenure; five years' work experience.

FLOOR APPEARANCE AND DEMOS

- Possibly place display cases outside elevators or in hallways
- Clean up labs
- Set up working displays in labs to show families on tour
- Present ideas at next department meeting

ROBOTIC ARMS AND AC MOTOR DRIVES

Ron Mehringer suggested removing the Hampdens and put in robotic arms and AC motors. Gary Todd will put proposal together for him and Ron to meet with the dean. It was suggested that we could use development funds to match the dean's funding.

EEET 390

Bob Most wants to formalize this course and add EEET 211 and EEET 222 as prereqs. He also indicated that this course could be offered to ESEN students. All faculty were in favor – voted unanimously to change this course to EEET 357 (if that number is available).
Curriculum proposal submitted and approved by UCC in spring 2013

BS DEGREE IN GRAND RAPIDS

- All reviewed Ron's proposal
- Equipment will/may be needed depending on what's already in Grand Rapids
- There may be funding from Don Green's group
- Per the curriculum proposal being reviewed, if a student fails one of the G.R. courses, he/she would have to wait until the course sequence starts again.
- Bob questioned EEET 412/422 – usually EEET students fail these as usually CNS students take these courses. Ron explained that the Grand Rapids students are a different caliber of student and they will have programming prior to taking these
- Faculty to review and discuss at next meeting
- There was a comment that an outline of required skills to enter EEET-412 be administered to prospective entrants to the program.

ENROLLMENT / RECRUITING

- Keith suggested the following: use student ambassadors: maybe use them at DAWG DAYS
  - Incentive – bring in new student and receive $100.00; earn an additional $25 for each additional student up to a cap range. Call it a Tuition Waiver or something along that line – transfer from CNS development to student account (Keith funds this account any way).
  - Pay a student to be a mentor to first and second year students.
- Fix our on-line image – something along the line of the HVACR web page (see Bob Most's PowerPoint for details)
  - add icons/links
  - Put the CNS video on YouTube; in fact, put all videos on YouTube
  - Make our web page interactive; less text
- Fix our curriculum page
- FSU is 58th in Google search; 11th if Michigan is added

CURRICULUM DISCUSSION = ⅃ indicates curriculum proposal submitted and approved by UCC in spring of 2013

- ⅃ Change ECNS 425 to 2 contacts for lecture and 2 contacts for lab
- EEET 100 – include FSUS 100 and EEET 111 content – 2 credits – fall offering – include OFFICE, VISIO, QBASIC; much discussion about transfer students not needed FSUS 100 if they transfer in with 12 + credits, but would still need the EEET 111 content? Ron to work on this
- Set up electives as "Recommended Electives" and "Directed Electives" (alternate electives); others as directed/approved by advisor
- ⅃ Change ECNS 322 to EEET prefix and move to the third year fall semester – all faculty were unanimous in their vote
- ⅃ Change EEET 412/422 to CNS instead of EEET prefix – all faculty were unanimous in their vote
- ⅃ Remove EEET 421 from program and catalog – all faculty were unanimous in their vote

· ⅃ Rewrite EEET 411 and call it Advanced Communications with 3 credits – all faculty were unanimous in their vote – Bob Most to do curriculum proposal

EET & CNS RETREAT MINUTES
Thursday, August 19, 2013

Present: Debbie Dawson, Keith Jewett, Steve Johnson, Warren Klope, Ron Mehringer, Bob Most,
Murry Stocking, Gary Todd

CONTINUOUS IMPROVEMENT PLAN

· Gary Todd uses a tracking method for his courses so he can evaluate progress, review for improvements, etc. He will send out to the faculty in case others want to use this same format.

· Consider adding EEIT to ABET accreditation

· Discussed dropping AAS and going with BS EEET only –

  o would eliminate Perkins funding for AAS degree lab and computer equipment

  o TIP students for CNS would not have an AAS degree to be listed in

  o Would we still be able to have SLA for EEET 114 and EEET 124?

  o How many AAS did NOT continue on to their BS degree?

  o Sandy and Ron will look into costs and what it takes to make EEIT ABET accredited

· ABET report will be due in 2015 for 2016 due date

· No other changes were deemed necessary at this time

ENROLLMENT TO DATE

· 399 – AUTO and HEAVY EQUIPMENT
· 552 – BUILT ENVIRONMENT
· 469 – OUR SCHOOL
· 550 – MFG, WELDING, PLTS

ACTION ITEMS FOR DEBBIE DAWSON

1. Faculty Loads and Enrollment

2. Recalculate capacities to see how they match up to previous
3. General studies, COB and math in ECNS 115

WHAT HAPPENS IF CNS CLOSES? WHAT HAPPENS TO US?

- The classes we all teach go away – ECNS 115/125/215/225/315/323/414/424/425
- We need to continue to push the CNS Minor
- Enrollment in EEET 111 would be reduced, as well as EET 114/124
- Several EEET courses in spring will go away
- SURVIVAL OF CNS IS IMPORTANT TO US ALL!

ACTION ITEM FOR DEBBIE DAWSON

1. President Eisler and Fritz presence at senior projects is important!

FACULTY STATUS – Keith is retiring at the end of this academic year

STATUS OF EEET OFFERING IN GRAND RAPIDS – not enough students to start this fall

SUMMARY PROJECTS – STEVE JOHSON

- Motor Trainers
- Petra's
- SWN 416 and 411 – now have projectors
- AD
- Reghosted all machines three times due to AD
- Tool Kits – new
- Meter – new – assemble in EEET 111 and redo to include office; assembly kit involves soldering-do we want to have first year students doing this? All agreed with concept

NEW TEXT FOR EEET 114/124

- Starting in the spring, we will be using the textbook by Floyd
- This fall we'll continue with the Herrick textbook

- Greatly effects EEET 214 – used Herrick text. Consider putting EEET 121 back in catalog-must be ready by next spring. Call it Electronics 1 – (4) credits, offered in the spring for freshmen

ACTION ITEM FOR SANDY K – add to next department meeting

MAPWORKS – it's a tracking and retention tool of students

APR

Report is due 08/01/14 for EEIT, CNS, all minors and certificates. Keith asked if we should we delay CNS report for one year due to his retirement? Will think about it and discuss at next department meeting.

INDUSTIRAL CONTROLS MINOR

- Welding students are taking this minor – we may want to consider moving the courses to the 6:00 pm time slot to accommodate their schedules. There have been time conflicts for EEET 414. Sandy will look into.

- Difficult for CNS students to obtain this minor due to lack of AC knowledge

MATH 115 EVALUATION

- Ron has been requiring MATH 116 when he advises new students
- Gary accepts MATH 115 if good grades
- Consider: how long since MATH 115 was taken, what are future plans (masters), grade of MATH 115 – then decide whether we will accept MATH 115 or require MATH 116

EXCEPTION REQUEST FOR SENIOR PROJECTS SPECIAL STUDIES

Ali Alhusayni needs a project for EET 497 Sr. projects Special Studies – after discussion, it was agreed that he could set up and program the PICK N PLACE equipment we recently received as a donation.

LATE REGISTRATION

PEIT – 1, EEIT – 2, PCNS – 2, INTERNATIONA; CNS – 1, EEET (Saudi) – 1, PEET – 3 (2) Nigeria and (1) India

RECRUITING

- Bob's meter is set up in his lab
- What other displays can we do in 402, 408, 413, and 416?
- Add a web cam?
- LINKED IN – business cards
- Need more information to go on the flash drive
- Use map to indicate where students are employed – had one but someone removed it
- What else can we do especially for CNS?
- Visits – who do we visit? ISDs for one group was suggested; homework-who is the audience?
- Bulldog Boards – Bob has two more:
    - Bulldog Brick
    - Bulldog Face

SURVEY TO EEET 111 CLASS

- How/when did you first hear about Ferris?
- What/who influenced your decision to come to Ferris?
- Did you receive packet including flash drive and kit?
- If so, what data or enclosures did you find helpful?
- Did it influence your decision in any way?
- How would you rate your on-campus experience so far?
- Any suggestions for changes or improvements?
- Did Ferris visit your school at any time that you are aware of?

DATES TO REMEMBER

- Department meetings – third Tuesday of each month
- 09/17/13 – Newaygo Career Tech Center – 10:00 am
- 10/01/13 – Muskegon – 8:30 am
- 11/01/13 – Careerline
- 11/05/13 – Traverse City Bay Area Career Center
- 11/12/13 – William D Ford Career Tech
- 11/26/13 – Char M ISD
- 12/03/13 – Lapeer Career Tech Center

INTERNSHIP REPORT - Good progress reports on all the students

ACTION ITEM FOR SANDY K - SWN 411 - discard (4) TVs

EET & CNS RETREAT MINUTES
Monday, August 18, 2014

Present: Debbie Dawson, Steve Johnson, Warren Klope, Ron Mehringer, Bob Most, Jeff Pedelty, Murry Stocking, Gary Todd

CNS POSITION

- Steve Johnson has accepted the position of CNS Tenure Track Faculty effective today. All joined in welcoming Steve.

BUDGET

- Our S&E is the same as last year. CET says they have no money to pay overloads and stipends. CET does not pay for summer classes; this cost comes out of another budget. The Directors are working to create enrollment caps.

ENROLLMENT

· EEET – 119 + CNS – 38 = Total of157 - increase from 106 in 2013

OVERLOADS AND ADJUNCTS

·Breakeven Point is SCH/FTEF = 360-380 (SCH = # of students x # of credits)

TRANSFER CREDITS AND COURSE WAIVERS

· EEET 210 and EEET 214 large lectures – all transfer students with AAAS degree still need these courses – no equivalent at community colleges. The same applies to EEET 224.

·What about AAS community college students coming to FSU? They still need EET 210, 214, and 224. Takes three years instead of two to get BS. Should we do proficiency test?

PROFICIENCY EXAMS

· Do credits show up on transcripts? Proficiency exam costs the student $25/credit hour – policy is to pay first, then take the test.

SENIOR PROJECT PRESENTATIONS

· There are 32 students in EEET 418, which we expect will take EEET 428 in the spring. That means there will be (10) projects for the presentations. We'll need a separate advisory committee meeting time, as the projects will take most of the entire day.

· Debbie Dawson will find any "WOW" projects. Ron Mehringer will limit each faculty member to advise two projects – no more this time. Are there any projects needed by faculty?

· Scheduled for April 24, 2015

MYDEGREE

·Templates only work in Explorer, not other browsers

· Be sure to LOCK worksheets so the students cannot change what you've recommended

·All faculty should take MYDEGREE training, if you're not up to speed on it already

CALCULATOR - WARREN KLOPE

·Warren will only support questions and assistance with certain types of calculators. An email was sent out to all his students about this.

EQUIPMENT TECHNICIAN JOB DESCRIPTION

· All reviewed the job description. Needs software and licensing, plus server experience. Debbie reminded everyone that this position reports to the school, not just to EET & Surveying.

MINIMUM WAGE INCREASE EFFECTIVE THIS FALL

·The Administration will pay 75% of the increase; the programs pay the remaining 25% of the increase.

PROGRAM COORDINATOR POSITION

·Ron Mehringer volunteered to remain as the program coordinator for two more years, if all want him to.

APR and ABET

· Add EEIT to the ABET accreditation cycle

· Keeping the 2+2

- easier transition for AAS transfer students
- Perkins funding
- TIP funded students

· Gary Todd agreed to be the ABET coordinator for our upcoming accreditation process

·All faculty received an electronic copy of the APR report. If there are any changes, send to Ron at earliest opportunity

CUSTOMER ENERGY SPECIALIST CERTIFICATE

·This certificate has not been used in several years. Ron proposed that we remove it from the catalog. All faculty were in favor.

INTERNSHIP REPORT FROM GARY TODD

There were (17) interns this summer; two were MIA – never paid.

GIVING TENURE TO DEBBIE DAWSON AND ALLOWING HER TO TEACH

· All faculty were in favor of granting her tenure, so Ron will prepare the appropriate documentation and request.

· Sandy will ask if Debbie is set up in Banner to be an instructor. All faculty are in favor of her teaching our courses.

CONTINUOUS IMPROVEMENT AND CURRICULUM PLANNING

· Reviewed current curriculum

·Discussed prereqs for transfer students

· Gary will send out to everyone his Course Reflection Form

· Discussed combining FSUS 100 and EEET 111 by building a project in the five weeks available. Drop EEET 111 from the curriculum and catalog effective next fall. All in favor. Sandy will start the curriculum proposal.

·Warren Klope feels it's important to redo the course descriptions for EEET 114, 124, and 214 to reflect more current technology and content. Sandy will do the curriculum proposal if Warren sends her the revised course catalog descriptions.

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· MECH 341 – add to block schedule – does it fit? Would that overload the sections already? Sandy will check into this.

· MATH 226 – discussed removing this course from curriculum as students are not being taught the course content. This has been an issue for several years. If we do this, then we can remove EEET 321 and 424 from the check sheet; OR remove EEET 321 and offer 424 in a different format.

·EEET 300 – blend EEET 424, MATH 226 and have EEET 313 as a prereq.

·EEET 321 – drop it – EEET 424 could pick up content, but it needs LABVIEW and Automation Studio.

·Change MATH 216 and 226 to MATH 220 and 230, add EEET 300, and drop EEET 321

- Recruitment –

  - How are our students informed about FSU? Word of mouth, school counselors, visit schools

  - What can we do to recruit more? Hold one day camps for kids and their parents? No overnighter to keep cost down, but would probably recruit closer to home. If we hold camps more than one day, we would draw more from longer distance.

ADVISORY COMMITTEE MEETING

Scheduled for October 24, 2014. Sandy will email the advisors

STUDENT WELCOME ASSEMBLY

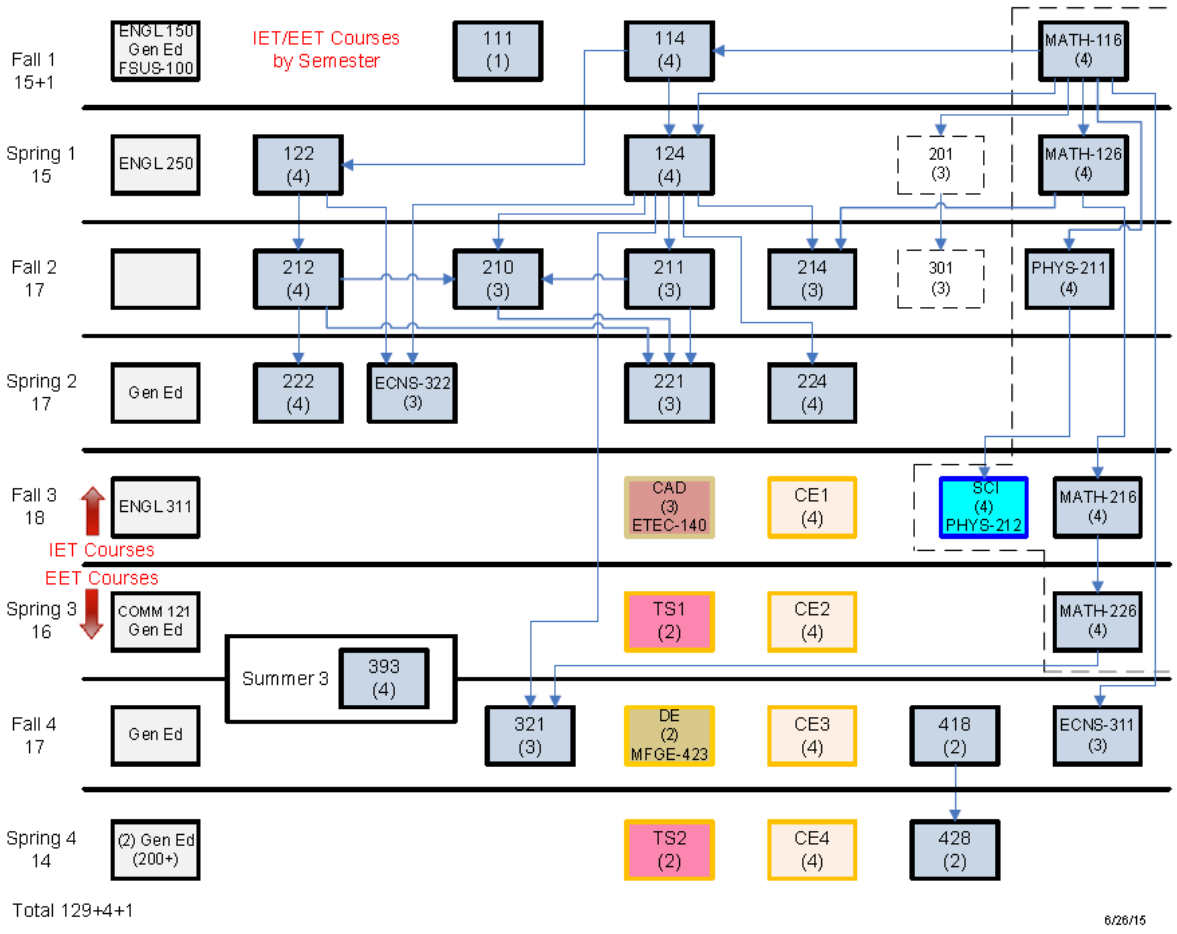
Scheduled for September 4, 2014, in NEC 203 at 11:00-11:50 am

CRITERION 5. CURRICULUM

A. Program Curriculum

Table 5-1 is best seen in the previous section labeled Check sheet.

Items 2 and 3 are addressed in earlier criteria Chart 3-1.



Item 5 is best addressed by the earlier Criteria Chart 3-1

The EEIT does not have a separate capstone course, however, there are capstone projects in several of the sophomore courses. Professor Most has an amplifier completion called "Make Silicon Sing" each year where students build, use, and sometimes destroy audio amplifiers. Professor Klope usually has a LabVIEW project for his PC Data Acquisition course and there is a final project for the introductory PLC programming course.

The EEET program has a capstone series. This consists of EEET 418 Project Management where students are introduced to the concepts of managing a large engineering project, Timelines, Work

Breakdown Structures, Gantt Charts MS Project, and other management tools. During this course, teams are formed and the Senior Project idea is cultivated. The next course is EEET 428 Senior Projects. During this course the students are given lecture time to develop logbook entry skills, status report writing techniques, presentation and poster session skills, and how to prepare for a major presentation. The students are given lab time to work with faculty to stay on a timeline and budget. This time is also available to use laboratory equipment under supervision and receive technical help from faculty. On the Friday of the fourteenth week (of a fifteen week semester) Senior Projects presentations takes place. This is a major event held in an Industrial Show like venue (the new University Center most recently). Family, friends, industrial advisors, alumni, representatives from local and statewide industry, and university administration are invited and attend. ALL EEET courses are cancelled for that day and current students (freshmen through junior) are required to attend and given excused absence slips from their non-EEET courses. Students must man a booth with a poster detailing their project and rotate to the stage for a 20-25 minute presentation. Lunch is provided by the department and students are given the opportunity to interact with the aforementioned industry leaders on a personal level. Many students have received job offers from this event. The presentations are graded by faculty and industry leaders, there is a "Best Project" award presented at the end of the day, and Outstanding Student awards are presented during lunch. Video recordings are available for ABET review.

This item is Not Applicable as the department/program does not offer Cooperative education.

The display materials will be provided for each course. These materials will include the textbook, lab manuals (if applicable), course syllabi, student work examples, and any other related materials including online access for mixed delivery courses. The course syllabi relate the materials in the course displays to the ABET criteria which are then related to the student outcomes.

B. Course Syllabi

Course Syllabi are attached in Appendix A

C. Advisory Committee

The Advisory Committee is composed of industry leaders from the mid-west and alumni who have become industry leaders. This is shown below in the composition of the Advisory Board. Activities include meeting one time per year face-to-face, meeting informally at Senior Projects Presentations, and email or Linked In contact throughout the year. As shown in the example minutes below the advisory committee meets with students independent of any faculty, anonymously reports the subject of that meeting to the faculty, are apprised of the current state of the department (including changes and enrolment numbers), and are asked for their input based on all the information they have received over the past year. They are also surveyed at that time for the purpose of continuous improvement.

FERRIS STATE UNIVERSITY
College of Engineering Technology

CNS and EET Industrial Advisory Committee

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The EEIT and EEET Department conduct an annual Advisory Board Meeting in the fall of each year, usually in early to mid-October and always on a Friday. Occasionally (usually due to advisor availability) the meeting will be rescheduled for the spring semester. Since the two programs are also tied to a non-ABET program, Computer Networks & Systems (CNS), the two (EEET and CNS) meetings are held the same day. This is primarily for the convenience of advisors that sit on both committees, but has proven to be quite efficient and a benefit to all (including students). The two groups alternate, by year, who holds their meeting first. The two meetings always overlap with lunch so the different advisors get a chance to interact with each other. The day starts at from 8:00 to 9:00 with coffee and refreshments and gives the advisors time to find parking and take care of last minute business before the meeting. The second (afternoon) meeting begins with lunch for the same reason. Below is a typical agenda.

FERRIS STATE UNIVERSITY
College of Engineering Technology

CNS & EET Advisory Board Meeting Agenda
October 17, 2014

EET Student Meeting:
9:00 AM to 10:00 AM
Swan 404

EET Program Meeting
10:00 AM to 12:00 AM
FLITE 438

CNS Student Meeting
1:00 PM to 2:00 PM
Swan 404

CNS Program Meeting
2:00 PM to 4:00 PM
FLITE 438

- ***Welcome and Introductions***
- ***Who runs the advisory board meetings? (New University Rules)***
- ***Report on Advisor-Student meeting***
- ***Steve Johnson – new faculty member in CNS***
- ***ECNS-315 Network Theory and Test***
- ***APR (Academic Program Review) for the CNS program completed***
- ***ABET Accreditation for AAS EEIT degree and BS EET degree this year***
- ***Course Restructuring in progress***
  - ***Electives vs Concentrations***
  - ***MECH 250 vs MECH 340***
  - ***MATH Sequence (116 series vs 115 series)***
  - ***EEET-321 vs EEET-300***
  - ***Credit Count***
- ***Fund Raising (Equipment)***
- ***Enrollment / Recruitment***
- ***Open Discussion***

At the conclusion of the meeting(s), the department secretary administers the advisory board survey. Following the meeting, the department secretary compiles the meeting minutes and distributes to all those member (in attendance or not), usually by the following Friday. An example of the EEIT/EEET Advisory Board minutes and survey is shown below. Full minutes to all meetings since the last accreditation visit will be available to the visiting team in October.

EEET ADVISORY COMMITTEE MEETING MINUTES

Friday, October 17, 2014

Welcome/Introductions

The meeting was opened by Professor Mehringer, Program Coordinator. He asked for introductions by all in attendance.

Discussion about Ferris' Direction for Advisory Committee Guidelines

Ron Mehringer presented a copy of the Surveying Engineering Advisory Committee guidelines. He explained that Ferris is leaning toward having the advisory committee run the meetings – set the agenda and take minutes, choose a chairperson, vice chairperson, secretary, etc., from the committee. All faculty and advisors agreed that they do not wish to go this route, but to continue with the system now in use. If it's not broke, why fix it!

The advisors did suggest more direction for them when they meet with the students, such as a list of questions to ask or some guidelines they can go by.

Student Feedback

- *Students like project-based courses – came from freshmen and sophomores*
- *Possibly mesh EEET and MET curriculum*
- *Cross training into other programs*
- *Generalized engineering course – review other programs – could even do general engineering course at high schools*
- *EEET 111 – needs to be more challenging and in depth*
- *Big Concern about Curriculum – no consistency between instructors in same course - primarily between first and second year levels*
    - *Could be change in textbooks*
    - *Such things as sabbatical and having to use different faculty from semester to semester*
    - *Maintaining even loads create situations where different faculty may have to teach same course*
- *Wants industry standard report format in lab reports*
- *Wants labs turned back to them sooner – timely feedback*
- *Why are they learning Hamptons – will they use them in industry?*
- *Computers are outdated – slow to come up*
- *Rest of equipment – they are satisfied with*

Course Restructuring

- *Discussed math sequence – continue with "6" series or move to the "0" series*
- *"0" series is for those students who plan to pursue their master's degree*
- *"0' series being considered due to lack of availability for the "6" series*
- *Curriculum is linear – if student fails prereq, this could put them behind a year*
- *There are 1-2 MECH courses that are accepted and recommended*

New Faculty tenure-Track Member

- *Steve Johnson is the replacement for Keith Jewett for the CNS program*
- *Need to hire someone in the Equipment Technician position – Ron handed out the job description in case an advisor knows or hears of someone who might be interested. Needs to have great skills.*

APR and ABET

- *CNS report has been submitted for review by the APRC; fully expect program will be recommended to continue. Will hear final recommendation later this semester. APRC said this report was the best one they have seen! The EEIT report was due at this same time; however, since we are seeking ABET accreditation for the AAS EEIT degree this next year, the APR was waived. We can submit the ABET reports now for any APR that's due for accredited programs.*
- *ABET for the EEIT/EEET programs are due this next year. Gary Todd will be the coordinator to assembly the materials and reports.*

NTT Course

- *This course was cancelled this fall for a couple of reasons:*
  - *Low enrollment in the course*
  - *Normally when a new faculty member starts, his load is lightened to get started. Steve Johnson was at full load without the NTT course. Low enrollment in the course made it possible to reduce his load and allow him to get immersed in teaching a full load this semesters.*

Fundraising

- *Both the EEET and CNS programs need funding to continue the programs. The advisors are being asked to look around and see what equipment they may be able to donate. Also, if they can financially support a purchase, that is much needed as well.*
- *The advisors are willing. They have asked for a list of needed equipment, which we will provide.*

Enrollment and Load

- *Enrollment is up for EEIT and EEET this year*
- *Enrollment continues to decline for CNS*

We're on a merry go round – Ferris wants us to recruit new students - cannot hire new faculty except adjuncts – all current faculty are fully loaded and most are overloaded – when is there time to recruit? It's a vicious circle.

Ferris State University
Industrial Electronics Technology - Electrical/Electronic Engineering Technology
Industrial Advisory Committee Evaluation

The purpose of this survey is to obtain information from the members of the Industrial Advisory Board regarding the curriculum, facilities, equipment, program outcomes, graduates, micro and macro trends that might affect job placement (both positively and negatively). Your assistance in this project is sincerely appreciated.

1. How would you rate the curriculum of the AAS EEIT program?

Excellent				Poor
5	4	3	2	1

Comments/Changes?

2. How would you rate the curriculum of the BS EEET program?

Excellent				Poor
5	4	3	2	1

Comments/Changes?

3. How would you rate the quality of the equipment used in both programs?

Excellent				Poor
5	4	3	2	1

Comments/Changes?

4. How would you rate the quality of the facilities for both programs?

Excellent				Poor
5	4	3	2	1

Comments/Changes?

5. For both programs, are the program outcomes and objectives appropriate for current industrial practice (see attached for reference)?

Excellent				Poor
5	4	3	2	1

Comments/Changes Recommended for Program Outcomes and Objectives:

6. From your discussion with the students, are students "meeting" the program outcomes and objectives?

Excellent				Poor
5	4	3	2	1

Comments:

7. What level of importance does your organization place on the ability to understand professional, ethical and social responsibilities when hiring an employee?

Excellent				Poor
5	4	3	2	1

8. How important is a student's respect for diversity and being knowledgeable of contemporary professional, societal and global issues to his/her employment and future?

Excellent				Poor
5	4	3	2	1

9. What micro or macro trends do you see in your industry that might affect job placement?

10. How might we improve the AAS EEIT and BS EEET programs?

Thank you for your time and feedback. You input is valuable to us!

Table 5-1 Curriculum

ELECTRICAL/ELECTRONICS ENGINEERING TECHNOLOGY
And
INDUSTRIAL ELECTRONICS TECHNOLOGY

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, or Quarter			Average Section Enrollment for the Last Two Terms the Course was Offered[1]
		Math & Basic Sciences	Discipline Specific Topics	General Education	Other				
FALL FRESHMAN SEMESTER									
EEET 111 Mobile Robots	R		1					Fall 2013 Fall 2014	2014-28 2013-32
EEET 114 Electric Circuits 1	R		4					Fall 2014 Fall 2013	2014-30 2013-30
ENGL 150 English 1	R			3					
MATH 116 Intermediate Algebra & Numerical Trig	R	4							
FSUS 100 FSU Seminar	R*					1		Fall 2014 Fall 2013	2014-22 2013-27
Cultural Enrichment Elective	SE			3					
SPRING FRESHMAN SEMESTER									
EEET 122 Digital 1	R		4					Spring 2015	2015-35 2014-41

						Spring 2014	
EEET 124 Electric Circuits 2	R		4			Fall 2014 Fall 2013	2014-15 2013-16
ENGL 250 English 2	R			3			
MATH 126 Algebra & analytical Trig.	R	4					
FALL SOPHOMORE SEMESTER							
EEET 210 Communication Circuits	R		3			Fall 2014 Fall 2013	2014-36 2013-23
EEET 211 Electronics	R		3			Fall 2014 Fall 2013	2014-32 2013-21
EEET 212 Digital 2	R		4			Fall 2014 Fall 2013	2014-40 2013-17
EEET 214 Advanced Electric Circuits	R		3			Fall 2014 Fall 2013	2014-37 2013-15
PHYS 211 Physics 1	R	4					
SPRING SOPHOMORE SEMESTER							
EEET 221 Troubleshooting	R		3			Spring 2015 Spring 2014	2015-18 2014-16
EEET 222 Microprocessor Applications	R		4			Spring 2015 Spring 2014	2015-40 2014-21

EEET 224 Industrial Automation and Motion	R		4			Spring 2015 Spring 2014	2015-23 2014-14
EEET 325 PC Data Acquisition and Control	R		3			Spring 2015 Spring 2014	2015-31 2014-15
Social Awareness Elective	SE			3			
FALL JUNIOR SEMESTER							
Concentration Elective 1 – usually EEET 313	SE		4			Fall 2014 Fall 2013	20104-21 2013-19
CAD Elective – ETEC 140	R		3				
ENGL 311 Advanced Technical Writing	R			3			
MATH 216 Applied Calculus	R	4					
PHYS 212 Physics 2	R	4					
SPRING JUNIOR SEMESTER							
Concentration Elective 2 – usually EEET 414	SE		4			Spring 2015 Spring 2014	2015-21 2014-18
Technical Science Elective	SE		2				
COMM 121 Fundamentals of Public Speaking	R			3			
MATH 226 Fourier Series/Applied Diff. Equations	R	4					
Cultural Enrichment Elective	SE			3			
SUMMER INTERNSHIP							

BETWEEN JUNIOR AND SENIOR							
EEET 393 Industrial Internship	R		4			Summer only	
FALL SENIOR SEMESTER							
ECNS 311 High Level Programming	R		3			Fall 2014 Fall 2013	2014-40 2013-24
EEET 321 Network Analysis	R		3			Fall 2014 Fall 2013	2014-25 2013-9
EEET 418 Project Management	R		2			Fall 2014 Fall 2013	2014-32 2013-21
Concentration Elective 3 – usually EEET 323	SE		4			Fall 2014 Fall 2013	2014-26 2013-16
Directed Elective – usually MFGE 423	SE		2				
Social Awareness Elective	SE			3			
SPRING SENIOR SEMESTER							
EEET 428 Senior Projects	R		2			Spring 2015 Spring 2014	2015-33 2014-21
Concentration Elective 4 – usually EEET 424	SE		4			Spring 2015 Spring 2014	2015-16 2014-5
Technical Science Elective	SE		2				
Cultural Enrichment Elective (200 level or above)	SE			3			

Social Awareness Elective (200 level or above)	SE			3			
Add rows as needed to show all courses in the curriculum.							
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE				134			
PERCENT OF TOTAL		18%	59%	22%	1 %		

CRITERION 6. FACULTY

A. Faculty Qualifications

Table 6-1 is completed below and Appendix B contains the CVs of each faculty. As can be seen by the curriculum vitae in Appendix B, the faculty of the EEIT and EEET department are well qualified to meet the program criteria. One of the criteria for becoming a faculty in the College of Engineering Technology at Ferris State University is that there must be significant industry experience in the applicant's background. Each faculty has at least five years of industry experience to bring to the classroom in their field of expertise. In a technology program, it is vital that the students understand the practical side of engineering and the experience the faculty bring to the classroom. In summary, the EEIT/EEET program has a professional engineer, two faculty with defense contractor engineering experience, one from a major auto manufacturer and other related companies, a VP of an engineering firm, and an electronics and automotive technician. Most faculty have had experience in teaching before coming to Ferris, however, those who did not have been very successful within the university. All have easily completed the rigorous tenure process (with the exception of adjuncts).

The EEIT/EEET department is currently deficient in faculty by a factor of two. The continuous overload and loading information clearly shows the need for two full time positions. At present time the department has been given permission to hire a full-time adjunct for fall and spring 2015, but not a full-time tenure-track faculty. Each semester ALL faculty are overloaded by at least 3 contact hours. The only exceptions are the Program Coordinator and new (or adjunct) faculty, each of which carry a full load. The coordinator is responsible for daily operation of the department and is awarded 50% release time to conduct this business. However, the loading does not allow for this release time and the coordinator must carry a full load (meaning they are really overloaded by 50%). This can be seen in Criterion 6 B/C.

B. Faculty Workload

Table 6 -2 is completed below.

C. Faculty Size

Size of the Faculty – The faculty currently consists of five (5) full-time faculty and one (1) part-time adjunct faculty. One faculty member in the CNS program also teaches some courses in the EEET curriculum. Because of the growth in the size of the number of students in the program, the faculty has been operating under overload conditions for the past four years. Loads are calculated on a credit hour basis or a contact hour basis. A full teaching load is considered to be twelve (12) credit hours or eighteen (18) contact hours per semester and twenty four (24) credit hours or thirty six (36) contact hours per year. The following is an

example of how the credit and contact hours are calculated based upon lecture hours and lab hours:

A class which consists of three (3) lecture hours and four (4) lab hours is calculated as follows:

- Four (4) Credit Hours – Three (3) lecture hours = three (3) credit hours + one (1) lab section of up to four (4) hours = one (1) credit hour.
- Seven (7) Contact Hours - Three (3) lecture hours = three (3) contact hours + four (4) lab hours = four (4) contact hours.
- Overloads in the EEET program are generally a result of contact hours. The following is the faculty loads for the fall 2014/spring 2015 semesters.

Instructor	Credit Load	Contact Load	Credit Overload	Contact Overload
Professor Warren Klope	20.5	43.5	-3.5	+7.5
Professor Ron Mehringer	29	50	+5	+14
Associate Professor Gareth Todd	26	48	+4	+12
Associate Professor Robert Most	24	42	0	+6
Assistant Professor Murry Stocking	29	42	+5	+6
* Assistant Professor Steve Johnson	25	38	+1	+2
** Adjunct Professor Jeff Pedelty	16+	31	N/A	N/A

D. Professional Development

Each faculty has the opportunity and limited funding is available for professional development. Attending conferences, buying educational material, buying experimental equipment, etc. In addition, every faculty has the ability to apply for sabbatical. The sabbatical process includes following university policy for application. This includes detailed research and descriptions of the activities planned for the sabbatical period and bibliography of the research. Once the application is passed by the college sabbatical committee it is sent to the university sabbatical committee where college rank order is maintained. In the past ten years only those applications that were deficient in merit have been rejected by the university committee. Once presented to the Board of Control, all have been funded. Sabbatical is an excellent opportunity for faculty research and has been supported by the university and board.

Official individual records of faculty professional development is not kept by the department per se. Faculty each conduct their own professional development and report their outcomes to the department at monthly meetings and/or the department fall retreat.

E. Authority and Responsibility of Faculty

While it is the responsibility of the faculty and department to create, modify outcomes and objectives, the university has very specific guidelines that must be followed in order to change and/or create courses and make major changes to programs. The links below are to the University Curriculum Committee website where these details are defined and flowcharted. Courses and changes are evaluated by the School Director and Associate Dean.

http://www.ferris.edu/HTMLS/administration/academicaffairs/vpoffice/senate/univcurrcomm/uccmanflowchartrevjan2015.pdf

http://www.ferris.edu/HTMLS/administration/academicaffairs/vpoffice/senate/univcurrcomm/

Table 6-1. Faculty Qualifications

EEIT and EET

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			Professional Registration/ Certification		Level of Activity[4] H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution			Professional Organizations	Professional Development	Consulting/summer work in industry
Warren Klope	MS	P	T	FT	6		28	28	NONE			
Ronald Mehringer	MS	P	T	FT	36		10	10	NONE			
Robert Most	MS	ASC	T	FT	27		17	10	NONE			
Gary Todd	MS	ASC	T	FT	18		19	14	NONE			
Steve Johnson	BS	AST	TT	FT	25		1	1	NONE			
Murry Stocking	BS	AST	T	FT	9		32	32	PE			
Jeff Pedelty	MS	A	NTT	FT	28		18	6	NONE			

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 6-2. Faculty Workload Summary

EEIT and EET

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]	
WARREN KLOPE	FT	Fall 2014: EEET 111 (1), EEET 114 (4) , EEET 124 (4), EEET 214 (3) Spring 2015: EEET 325 (3), EEET 114 (4), EEET 124 (4)	100%			100%
RONALD MEHRINGER	FT	Fall 2014: EEET 212 (4), EEET 418 (2) , FSUS 100 (1) Spring 2015: EEET 428 (2)	50%		50%	100%
ROBERT MOST	FT	Fall 2014: EEET 210 (3), EEET 211 (3), ECNS 414 (4) Spring 2015: EEET 221 (3), EEET 222 (4), ECNS 424 (4)	100%			100%
MURRY STOCKING ??	FT	Fall 2014: EEET 201 (3), EEET 301 (3) Spring 2015: EEET 201 (3), EEET 301 (3)	100%			10)%
GARETH TODD	FT	Fall 2014: EEET 313 (4), EEET 321 (3), EEET 323 (4) Spring 2015: EEET 224 (4), EEET 414 (4), EEET 424 (4)	100%			100%

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.

CRITERION 7. FACILITIES

A. Offices, Classrooms and Laboratories

The Ferris State Universities EEET department occupies space within the fourth floor of the Swan building. This space contains administrative office space, lecture rooms, lab facilities, and a student lounge.

1. Offices consist of administrative and faculty:

    a. The administrative office is located within the EEET department. The Program director and Support secretary reside at this location. This location provides faculty mailboxes, a copy machine, printers, and supplies needed for instruction. Faculty schedules are posted on a bulletin board.

    b. Faculty offices are in an adjacent building, Johnson Hall. This building also supports faculty from other departments and provides copy machines, printers, supplies, and other office resources. Faculty schedules are provided at each faculty office.

2. Classrooms: There are two classrooms within the EEET department. Each classroom provides power for student laptops, a projection system with its own PC as well as providing external inputs for laptop, IPads, DVD & VHS. Whiteboards are also provided.

    Other classrooms are available from the University as scheduling requires.

3. Lab facilities consist of five laboratories:

    a. The Analog Multi-Purpose Lab is mainly used for introduction to electronics and data acquisition. Each station is equipped with the general tools needed for analog testing and PC data acquisition. It consists of 9 student stations plus 1 instructor station where each station contains: NI Elvis, oscilloscope, 3-output power supply, 2 DMMs, function generator, 120v variAC, and isolation transformer. Resources available in the room: fixed voltage 3 phase power; analog meters; decade boxes of resistance, capacitance, and inductance; curve tracers; LC meter; soldering equipment; and Feedback equipment containing amplifiers, sensors, and motors.

    b. The Automation Power Lab provides controlled three phase power, PLC training with controlnet, devicenet, ethernet networks, the Universal Laboratory Machine for large motor control, and provides compressed air for some of our industrial automation projects. It contains 9 student stations providing: PC, oscilloscope, two

power supplies, DMM, function generator, and universal counter, variAC 3 phase power, and 8 stations of the Universal Laboratory Machine. Resources available in the room are: decade boxes of resistance, capacitance, and inductance, analog meters, watt meters, clamp-on amp/watt meters, 3 phase light fixtures, generators, Motors, PLCs (PLC I/O, controlnet, devicenet, Ethernet, displays, servo controllers), automation parts (relays, switches, sensors, etc.), and house compressed air.

c. The Communications Lab is used for communications, troubleshooting, and microprocessor training. Each of the 9 student stations is equipped with the general tools needed for analog testing and data acquisition with access to communication test equipment and microprocessor. Each station contains: PC, NI Elvis, oscilloscope, two 3-output power supplies, 2 DMMs, and function generator. Resources available in the room: decade boxes of resistance and capacitance, LC meter, M68HC11 trainers, breadboard trainers, spectrum analyzer, transistor testers, RF generators, AM/FM stereo analyzers, distortion analyzer, signal generators, counters, isolation transformers, and 120v variAC.

d. The Industrial Lab provides compressed air for some of our industrial automation projects, relay training and small motor control. 8 student stations contain: PC, oscilloscope, 3-output power supply, DMM, and function generator. Resources available in the room include: fixed voltage 3 phase power, house compressed air, decade boxes of resistance and capacitance, analog meters, variACs, relay trainers, motor controller trainers, Petra automation factory, PLCs, automation parts (relays, switches, sensors, etc.).

e. The Multi-Purpose Lab is a general purpose lab where most of the equipment is not fixed to the bench. This is mainly the microprocessor, programming and digital lab with logic analyzers and software programming packages. Equipment is usually set up and available dependent on the project. 12 student stations contains: PC and NI Elvis. Resources available in the room: oscilloscopes, function generators, DMMs, power supplies, uP trainers, logic analyzers, pulsers, probes, and universal programmers.

Student lounge: The student lounge contains a community table providing Laptop power, three PC workstations, multi-sheet scanner, and a networked printer for student's usage.

B. Computing Resources

Each student entering the EEET program is required to purchase a laptop. Ferris provides student access to Microsoft Office at reduced rates and other required software is either free educational versions or provided on Lab machines.

Lab machines provide standard Microsoft Windows 7 with MS Office, MS Visual Studio, NI Circuit Design Suite, NI LabView, Xilinx ISE, Rockwell automation software, other free educational software, and have access to the Internet, There is also a networked printer in every lab.

C. Guidance

Lab safety rules are reviewed with all students the first week of classes each semester. All students are required to sign the form acknowledging their understanding and acceptance. A copy of the Lab Safety Rules form is below.

Safety Rules for Labs

General Rules:

1. No horseplay or running is allowed in the labs.

2. No bare feet or open sandals are permitted.

3. The use of the Internet is encouraged for component data sheets and related information. The use of the internet for entertainment or unrelated use is prohibited. Visiting websites which are offensive to others will result in expulsion from lab and forfeiture of the lab grade for the week.

4. Position all equipment on benches in a safe and stable manner.

5. Do not bring tobacco products, food or beverages near the work areas in the labs.

6. Tag instruments with badly frayed or broken power leads and deliver them to the shop for repair. Notify your instructor.

7. Read the appropriate equipment instruction manual sections or consult with your instructor before applying power or connecting unfamiliar equipment or instruments into any circuits.

Energized Circuits:

8. Before energizing any equipment, check whether anyone is in a position to be injured by your actions.

9. When working on equipment where more than 50 volts (RMS AC or DC) exist between circuit points and/or ground, get your lab instructor's approval before energizing the circuit.

10. Do not make circuit connections by hand while circuits are energized. This is especially dangerous with high voltage and current circuits.

11. Do not work alone in the lab if equipment is energized; at least one other person is to be present.

12. The use of 110 volts, 60 Hz. plug-in cords with open wire or alligator clip ends is hazardous; use them only with the permission and direction of your instructor.

13. For safety reasons, metal cases of instruments and appliances are usually grounded through the third wire ground. Do not consider any departure from the use of the third wire ground. e.g., "cheater plugs," without the instruction and supervision of your instructor. Failure to know whether or not an instrument case is grounded can lead to hazardous circuit conditions.

14. Remove metal rings and metal watchbands when working around energized (especially high voltage and current) circuits.

15. Treat high voltages with care to avoid endangering your life or the lives of your lab partners.

Emergency Power Off:

16. Every lab is equipped with an Emergency Power Off System. This consists of a large red pushbutton switch on the wall. When this switch is depressed, electrical power to the lab will shut off, except for the lights. Only authorized personnel are permitted to reset power once the Emergency Power Off system has been engaged.

The FSU 100 class provides students guidance with University resources. Students discover how to access the University's Library resources, student associations, and help through tutoring services. Guidance on laboratory equipment is provided through lab introductions and throughout the courses as electronic principles are introduced.

D. Maintenance and Upgrading of Facilities

The EET department employs its own repair technician. Broken equipment is tagged and brought to the technician for repair. Faculty create and prioritize a "wish list" for equipment needs and it is purchased as budgets allow.

E. Library Services

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 varEEITy 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.

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.

F. Overall Comments on Facilities

Facility safety is a large concern of the EEET department. Lab introductions include a lab safety sheet which every student must read and sign. Instruction is the largest preventative measure but each laboratory has an easy access emergency power disconnect in case of electrocution.

Classrooms and laboratories provide lockable doors and telephones for emergency situations as the University takes student safety very seriously.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

The College of Engineering Technology is under the direction of the CET Dean and is organized into schools. Each school has a Director who acts as the administrator for multiple programs and reports to the Dean of the CET. The figure below is an organizational chart for the CET.

Debbie Dawson is the Director of the School of Engineering and Computing Technology and the Electrical/Electronics Engineering Technology, Computer Networks and Systems, Energy Systems Engineering, Mechanical Engineering Technology, Product Design Engineering Technology and Surveying Engineering programs all report to her. Each program has a faculty coordinator who is given release time to perform non-personnel related administrative functions for the program. Ron Mehringer receives a 50% release to serve as program coordinator for the Electrical/Electronics Engineering Technology programs. The following links point to the job descriptions for School Director and Program Coordinator within the CET:

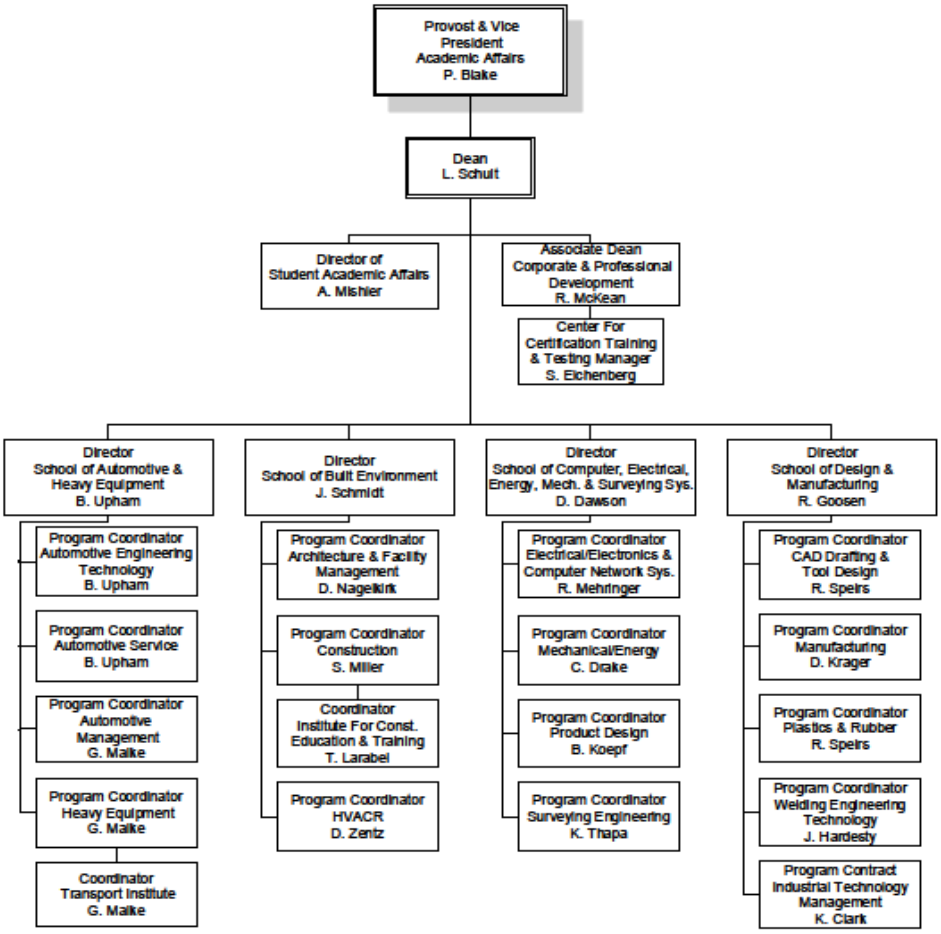
School Director

Program Coordinator

Ferris State University Organizational Chart

FERRIS STATE UNIVERSITY
ACADEMIC AFFAIRS DIVISION

COLLEGE OF ENGINEERING TECHNOLOGY



B. Program Budget and Financial Support

Annual college budget allocations are determined by the Vice President for Academic Affairs. Budgets for individual programs within the College of Engineering Technology are determined by the Dean, Associate Dean and School Directors. Budgets for the last 4 years for the EEIT/EEET/CNS programs are as follows:

	2010/11	2011/12	2012/13	2013/14	2014/15
Budget	36028.00	32944.00	32330.00	30343.54	32330.00
Spending	30192.54	32803.55	34349.39	36281.39	32277.86

**Estimate – Final budget data unavailable at time of report

The sources of financial support are as follows:

Academic Affairs Division: Provides funding to the colleges for all campus academic units; Faculty Development Grants; Programmatic Marketing; Perkins Grant Fund;

College of Engineering Technology Dean's Office: Provides annual department level Supply & Expenditure Budgets; Faculty Development Grants; One-Time Equipment Purchase funding; Distribution of allocated Perkins Fund designations;

Program Level: Program donations; Recyclable materials sales;

Student Scholarships: This financial support is received directly by the students from various outside entities. This is a measure of program support by business & industry and professional societies.

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

Ferris State University is not a research institution, but rather a teaching institution. Therefore it is very supportive of teaching. The university maintains a "Faculty Center for Teaching and Learning" which makes resources available to faculty members to help them improve their classes. They also have frequent teaching workshops that faculty members can participate in.

The following link shows the resources available for faculty: http://www.ferris.edu/fctl/

The Vision, Mission and Values of the Ferris Faculty Center for Teaching and Learning can be found in the following link:
Vision, Mission and Values of Ferris FCTL

The College of Engineering Technology provides funding for lab assistants to help faculty better run hands on laboratory classes. This gives the instructor another set of eyes, ears and hands to help classes run more smoothly and safely. Graders and teaching assistants are not made available to faculty at Ferris State University.

2. *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.*

Adequacy of Equipment

The facilities within the Electrical/Electronics Engineering Technology program are first rate. The level of equipment present in the electrical/electronics lab facilities is primarily a result of the faculty relationship with industry. Industry leaders have recognized the long-term benefit of students learning on their equipment prior to entering the workforce. Equipment has been obtained by a variety of resources, including:

- Industrial Consignment Agreements: The electrical/electronic programs have received tremendous support from industry for many years. Formal consignment agreements insure that both the University and the consigning company receive the proper recognition and benefits from this relationship. Equipment is generally replaced on a bi-annual basis by the manufacturer. Manufacturers support the installed equipment through warranty service, technical documentation, and practical demonstrations and seminars.

- University Funding: Funding for program level capital equipment purchases through university resources is available. These opportunities are in the form of either "One-Time" funding or Perkins Grant funding. Both of these funding opportunities are available annually. One-Time funding is a College of Engineering Technology opportunity. Programs submit requests to the CET Dean's Office with justification and reasoning for the purchase request. Funding decisions are made out of the Dean's Office after department-level conversations. The Perkins Funding opportunities work much in the same way as "One-Time" funding, but are coordinated out of the Vice President of Academic Affairs Office and are campus wide. The Welding Engineering Technology programs have benefited from both of these funding mechanisms.

- Program Funding: The Electrical/Electronics Engineering Technology program has purchased required equipment from the annual Supply & Expenditure (S&E) Budget and the program Local Fund. The S&E funds are received from the College of Engineering Technology Dean's Office and are targeted for the annual operation of the department programs. It has been necessary in past academic years to purchase equipment from this fund in order to continue operation of a course in progress. These have typically been relatively small dollar amount items less than $2,000. Purchases

from this fund are subjected to strict University policies. The department "Local Fund" is available for the program to spend at its discretion. Although this fund is also mandated by University policy, the program has more flexibility regarding purchases. This fund has supported the related programs such as Material Science as well.

- Donations: Monies and equipment has also been "gifted" to the program. Equipment becomes property of the University and is typically tax-deductible to the donor. Cash is used according to the donors' wishes. This may be for current program needs or put into the endowment for future needs.

3. *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.*
   As can be seen from item 1 above, the supply and expense budget is insufficient for program operation. Faculty are forced to pursue creative ways to fund program needs. This underfunding jeopardizes achievement of student outcomes. If proposed facility expansion comes to fruition, program expenses for increased enrollment and facilities will go up even further. Program budgets need to be sized accordingly.

C. Staffing

Our immediate support personnel consists of one school director, one faculty member as program coordinator with 1/2 release time, two full-time school secretaries (shared between programs), and one full-time technician (shared between programs). All of the other support divisions such as Academic Affairs, Business and Financial, Skilled Trades, etc., are more than ample to support the program educational objectives and program outcomes.

D. Faculty Hiring and Retention

The employment hiring process at Ferris State University is well defined. The Electrical/Electronics Engineering Technology faculty and staff work directly with FSU Human Resources Office to ensure the best possible candidates are located and that the hiring process follows all requirements. Every effort is taken by the department to promote and market the employment opportunity within the program to as many outside entities as possible. The FSU Hiring Process Guide can be found at the following link:

Ferris State Hiring Process Guide

The EEIT/EEET program faculty consists of five (5) full time faculty members with a combined total years of teaching at Ferris of 100+ years. The current faculty have a deep commitment to the students and the university. Faculty members are typically hired in to Ferris at a salary less than a comparable industry levels. Within the College of Engineering Technology, and the University, pay increases are available through various means as the faculty gains years of service. Faculty are the "constant" at Ferris State!

Tenure:

Full-time welding program faculty are typically hired as "Tenure-Track Faculty". During the five (5) years of service the tenure-track faculty is constantly evaluated by faculty peers both within and outside of the academic program. Gaining tenure is done by a department faculty recommendation to the Ferris State administration. A Tenure-Track faculty must apply for tenure no later than their fifth academic year. The CET 11-Program Tenure Policy can be found at the link below:
CET Signed 11- Department Tenure Track Policy

Ferris Faculty Association (FFA) Collective Bargaining:
The FFA collective bargaining agreement provides many benefits to Ferris faculty members. These include the following opportunities that can be found with in the current FSU & FFA, MEA-NEA contract which expires June 30, 2018. These benefits have proven to be key in retaining qualified welding program faculty in past years.

Below is a description for some of these benefits as they can be found in the Benefits including, but not limited to, include 403b contributions, health insurance, dependent tuition waivers…

Section 13: Fringe Benefits

While it is widely understood that the initial employment compensation levels are well below industry levels, many avenues are available to a faculty member to increase their Ferris salary compensation. These opportunities for an increase in salary compensation are afforded to a faculty member through the Collective Bargaining Agreement between the Ferris Faculty Association.

Section 14: Salary
- 14.2: Percentage Increase to Base Salary
- 14.3: Supplemental Market Adjustments
- 14.4: New Faculty Orientation
- 14.5: Request for Internal Salary Equity Review

Section 15: Promotion and Merit Increases
- 15.3: Compensation for Promotions/Merit
- 15.4: Degrees

The Ferris Faculty Association (FFA) Collective Bargaining document can be found at the link below:
Ferris Faculty Association (FFA) Collective Bargaining

E. Support of Faculty Professional Development

Opportunities for faculty development are very good. The College of Technology Dean's Office encourages and supports faculty in development activities. Potential activities are selected by an individual faculty member; an application is completed by the faculty member, supported by the Department Chair and submitted to the College of Technology Associate Dean. Upon receipt the

Associate Dean will evaluate the faculty application and respond directly to the faculty member. Approved professional development activities are supported financially for various aspects of the project including travel, lodging, conference fees, support materials, meals, etc. Upon completion of the event the faculty member is required to submit a project summary report detailing the experience and how this obtained knowledge will support classroom activities. Upon review of this report by the Associate Dean, reimbursement funds are then transferred to the department.

F. Overall Comments on Facilities

The facilities, tools, and equipment are monitored and maintained by several agencies at Ferris State University. The facilities management department maintains the buildings and structural components of the program. Tools and equipment are monitored and maintained by the Electronic Technician for the EEIT/EEET/CNS programs. Periodic maintenance and repair of all equipment and computers for the EEIT/EEET/CNS programs are the responsibilities of the Electronic Technician.

PROGRAM CRITERIA

Refer to Chart 3-1 above for the coordination of criteria and program and course content.

Appendix A – Course Syllabi

Course: **ECNS 311** **High-level Programming (Required Course)**

Credits:	3 Hours
Contacts:	2 Lecture hours, 2 Lab hours per week
Course Description:	Course teaches the fundamentals of C and C++ programming with emphasis on embedded systems and technical applications. C/C++ will be used to solve engineering problems and to introduce concepts of modular program design, object oriented programming, real-time control, system hardware/software dependencies, and other software engineering topics. Topics include structured program design, C/C++ input and output, functions, pointers, arrays, structures, run-time libraries, classes and object oriented design.
Course Prerequisites:	Pre-Requisites: MATH 116 or MATH 126 or MATH 216 or minimum score of 24 on ACT or minimum score of 560 on SAT.
Required Textbooks:	Keninghan, Brian W. & Ritchie, Dennis M., "The C Programming Language", Prentice Hall Software Series, 2nd Edition, 46th Printing 2010, ISBN 0-13-110362-8
Faculty:	Steve Johnson

Student Learning Outcomes

Students satisfactorily completing this course will:

1. Understand the command syntax of the C/C++ programming language.
2. Understand the building and compiling of C/C++ projects.
3. Understand program execution and basic debugging methods.
4. Understand object oriented programming.
5. Possess the ability to migrate C/C++ programming onto different platforms like embedded systems, different operating systems, and real-time systems.

*Program Outcomes a, d, f and k are reinforced in this course.

Instructional Unit Topic Descriptions and Time Allocations

	UNIT TOPIC DESCRIPTION SUMMARY	LEC HRS	LAB HRS
I.	Course Introduction	1	
II.	Development Tools Introduction	1	2
III.	Datatypes and Writing a C/C++ Program	2	2
IV.	Branching, Logic, and Loops	2	7
V.	Provide formatted Input/Output	1	
VI.	User defined Functions	1	3

VII.	Structures and Unions	2	1
VIII.	Pointers and Arrays	2	3
IX.	Disk I/O, FileStreams	2	2
X.	C++ Classes	6	4
XI.	Special Consideration for migrating to different platforms	3	4
XII.	The compile process	1	
XIII.	Special Considerations for Embedded Systems	2	2
XIV.	Tests and Review	4	
	Total Hours	30	30

Course: ECNS 323 Real Time Operating Systems (Concentration Course)

Credits/Contacts:	4 Credits; 3 lecturer hours, 3 Lab hours per week
Course Description:	Computer operating systems that provide features and performance suitable for high speed control is called real time operating systems. This course will introduce the theory, functional components, features, and specifications of real time operating systems. Lab projects will re-enforce lecture topics and provide experience programming and analyzing real-time operating systems.
Prerequisites:	Pre-Requisites: ECNS 311 with minimum grade of C-
Required Textbooks:	Stallings, William, "Operating Systems Internals and Design Principles", Pearson – Prentice Hall, 7th Edition, 2012.

Faculty: **Steve Johnson**

Student Learning Outcomes

Students satisfactorily completing this course will:

1. Understand the basics of operating systems.
2. Demonstrate an ability to write applications that utilize operating system features and interfaces.
3. Understand concurrency, mutual exclusion and message synchronization and the operating systems role in these techniques.
4. Understand issues with concurrency such as Deadlocks, Starvation and Spinlocks.
5. Demonstrate an understanding of real-time hardware and software concepts.

*Program Outcomes a-g are reinforced in this course.

Brief List of Course Topics:

uProcessor Systems
Operating Systems
Processes
Threads
Concurrency
Mutual Exclusion
Deadlock & Starvation
Concurrency Pitfalls
TOCTTOU
Avoiding Concurrency Problems
Introducing Linux and Concurrency
Memory Management
Virtual Memory
Uniprocessor Scheduling

Mid-Sem Recess – No Class
Multiprocessor Scheduling
Multiprocessor Scheduling

Course ECNS-414 Advanced Digital Systems (Concentration Elective) :

Credits: 4 Hours

Contacts: 3 Lecture, 3 Lab Hours per Week

Course Description: *As a continuation of EEET 222, this course will expand the concepts of internal CISC microcontroller hardware with advanced assembly language. Advanced concepts such as timers, pulse width modulation and feedback control will be explored. Introduction to embedded systems will be introduced using embedded C language with existing hardware and software tools.*

Course Prerequisites: EEET 122, EEET 212, EEET 222 (Minimum 70 required in each course)

Required Textbooks: Software and Hardware Engineering: Assembly and C Programming for the Freescale HCS12 Microcontroller, Frederick M. Cady, 2nd Edition, ISBN-13: 978-0195308266

Freescale Data Sheets – available as free PDF files – details in class

Required Materials: Electronics kits for lab. Calculator with hexadecimal capability.

Faculty: **Professor Robert Most**

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. Use of assembly language in CISC microcontroller A/D conversion
2. Feedback control using lab hardware and software
3. Use of C language in embedded applications
4. Application of an Integrated Development Environment in executing and debugging software and hardware

Course Schedule

Fall 2014 Events Schedule ECNS-414

Week		Date	Assignment	Due	Last day to turn in for credit	Comments
1	T	26-Aug	Homework #1 / Lab #1			
	R	28-Aug				
2	T	2-Sep				
	R	4-Sep		Homework #1	Homework #1	Solutions Distributed
3	T	9-Sep	**BART Test #1**, Homework #2 / Lab #2			
	R	11-Sep		Lab #1		
4	T	16-Sep	Lab #3			
	R	18-Sep		Lab #2	Lab #1	
5	T	23-Sep	Lab #4	Homework #2		Solutions Distributed
	R	25-Sep	**TEST #2**	Lab #3	Lab #2	
6	T	30-Sep	Lab #5, Homework #3			
	R	2-Oct		Lab #4	Lab #3	
7	T	7-Oct				
	R	9-Oct	Lab #5 Continued		Lab #4	
	F	10-Oct	Advisory Meeting			
8	T	**14-Oct**	Lab #6	Homework #3	Homework #3	Solutions Distributed
	R	16-Oct	**TEST #3**	Lab #5		
9	T	21-Oct	Lab #7, Homework #4			Mid Term Grades Due 9AM (Mon)
	R	23-Oct		Lab #6	Lab #5	
10	T	28-Oct	Lab #8			
	R	30-Oct		Lab #7	Lab #6	Last day for 'W' Grade
11	T	4-Nov	Lab #9	Homework #4	Homework #4	Solutions Distributed
	R	6-Nov	**TEST #4**	Lab #8	Lab #7	
12	T	11-Nov	Lab #10, Homework #5			
	R	13-Nov		Lab #9	Lab #8	
13	T	18-Nov				
	R	20-Nov	Lab #10 Continued		Lab #9	
14	T	25-Nov		Homework #5	Homework #5	Solutions Distributed
	R	27-Nov	Thanksgiving Holiday >>>>>>>>>>>>>>>>>>>>>>>>>>			
	F	28-Nov	Thanksgiving Holiday >>>>>>>>>>>>>>>>>>>>>>>>>>			
15	T	2-Dec	**TEST #5**			
	R	4-Dec	No Lab	Lab #10 (due in class)		
16	M	8-Dec	<<<<<<Finals Week>>>>>>>		Lab #10	
			Note: Homework due at beginning of class period.			
			Labs must be checked off in lab before due date for credit.			
			No Checkoff == No Grade			

Course: ECNS-424 Advanced Digitals II

Credits: 4 Hours

Contacts:	3 Lecture, 3 Lab Hours per Week
Course Description:	*This course is the culmination of microprocessor application with digital electronics. Emphasis will be given in embedded real time applications, both in hardware and software. Software applications will be analyzed using an in-circuit debugger, using high level C programming algorithms. RISC based microcontroller architecture will be explored using the Microchip PIC series Flash based devices.*
Course Prerequisites:	EEET 412 (Minimum 70 required)
Required Textbooks:	Microchip PIC18F4520 PDF – 390 pages, free download
Course Web Site:	Reference materials, homework, handouts and updates can be found under this course in MyFSU through the Ferris State University home page.
Required Materials:	Electronics kits for lab, Microchip PICDEMO2+ board.

Faculty: Professor Robert Most

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

5. RISC based Harvard architecture using the PIC18F4520
6. PIC18F4520 assembly and C language
7. PIC18F4520 peripherals – A/D, I/O, I^2C, RS-232, LCD panel
8. Final project designing a C based RTOS using all peripherals with PC interface

Course Assessments

Student learning outcomes will be assessed as follows:

- Five Exams through the semester
- Graded Lab Reports
- Formal Lab Report and Presentation

*Program Outcomes _____ are reinforced in this course.

Course Schedule

Winter 2015 Events Schedule ECNS-424						
Week		Date	Assignment	Due	Last day to turn in for credit	Notes
1	T	13-Jan				
	R	15-Jan				
	F	16-Jan	Lab #1			Lab #1 is not turned in
2	T	20-Jan				
	R	22-Jan				
	F	23-Jan	Lab #2			
3	T	27-Jan	Lecture and Lab Cancelled			
	R	29-Jan	Conference			
	F	30-Jan				
4	T	3-Feb		Lab #2 Report (in class)	Lab #2	
	R	5-Feb	**Test #1**			
	F	6-Feb	Lab #3			
5	T	10-Feb				
	R	12-Feb				
	F	13-Feb	Lab #4	Lab #3 Report		Lab #5 extra credit lab!
6	T	17-Feb				
	R	19-Feb				
	F	20-Feb	**IDL #1**	Lab #4 Report	Lab #3	
7	T	24-Feb	**Test #2**			
	R	26-Feb			Lab #4	
	F	27-Feb	Lab Cancelled - Robotics Competition			
8	T	3-Mar				
	R	5-Mar				
	F	6-Mar	**IDL #2**	**IDL #1 Report**		
SPRING BREAK March 7th thru March 15th						Midterm grades due 3/8
9	T	17-Mar		**>IDL #1 Presentation<**	**IDL1**	
	R	19-Mar				
	F	20-Mar	Lab Cancelled - Robotics Competition			
10	T	24-Mar	**Test #3**			
	R	26-Mar				Last day for "W" grades 3/26
	F	27-Mar	**IDL #3**	**IDL #2 Report**		
11	T	31-Mar				
	R	2-Apr	Easter Recess April 2nd-5th			
	F	3-Apr				
12	T	7-Apr		**>IDL #2 Presentation<**	**IDL2**	
	R	9-Apr				
	F	10-Apr	**IDL #4**	**IDL #3 Report**		
13	T	14-Apr		**>IDL #3 Presentation<**	**IDL3**	
	R	16-Apr				
	F	17-Apr				
14	T	21-Apr	**Test #4**			
	R	23-Apr				
	F	24-Apr	Senior Project			
15	T	28-Apr		**IDL #4 Report**		
	R	30-Apr		**>IDL #4 Presentation<**	**IDL4**	
	F	1-May	**Test #5 (optional)**			
16	M	4-May	<<<<<<Finals Week>>>>>>>			

Course: EEET 111 (Required Course)

Credits: 1 Hours (Double Pace – 8 weeks long)
Contacts: 1 Lecture Hour and 2 Lab Hours per Week
Course Description: Mobile Robots explores modern robots through design, construction and performance test. The course will also look at the broader aspect of different engineering disciplines working together in the robotic field. All students are welcome.
Course Prerequisites: None

Required Textbooks: Stiquito for Beginners, An Introduction to Robots, Conrad and Mills,

IEEE Computer Society, John Wiley & Sons, Inc., 1999 ISBN 0-8186-7514-4.

Faculty: Prof. Warren Klope

Student Learning Outcomes

Upon completion of each instructional unit, the learner will be able to satisfactorily:

Student will demonstrate an understanding of robots and robotics by completing online exams.
Student will demonstrate basic hands-on skills by constructing a Stiquito hexapod robot.
Student will describe and discuss engineering disciplines in classroom discussions.
Student will analyze the performance of their Stiquito hexapod robot.
Student will prepare and present a formal report on the construction of the Stiquito hexapod robot.

*Program Outcomes a, b, c, e, f, g, k are introduced in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LEC HRS	LAB HRS
I.	Introduction to Robotics 1) Types: wheeled, leg, stationary 2) Uses: home, industry, military	1	2
II.	Engineering Disciplines:	1	2

	1) Electrical, mechanical, civil, environmental, chemical 2) Technician, engineering technologist, engineer, scientist		
III.	Engineering Related Skills and Processes 1) Problem definition, information gathering, modeling, evaluating, 2) Implementing.	1	2
IV.	Robot Components 1) Gears, arms, cables, chains 2) Materials	1	2
V.	Robot Movement 1) Axis of motion 2) Linear, circular, range, speed	1	2
VI.	Robot Control 1) Mechanical, Hydraulic, pneumatic, electronic	1	2
VII.	Robot Performance 1) Testing, benchmarking	1	2
	Total Hours	7	14

Course: EEET 114 Electric Circuits 1 (Required Course)

Credits: 4 Hours
Contacts: 3 Lecture, 4 Lab Hours per Week
Course Description: An introduction to the basic principles of electric circuits including voltage, current, power, resistance, series, parallel and combination circuit analysis. The course approaches these topics from a systems viewpoint which emphasizes the application of basic concepts to actual circuits and devices.
Course Corequisites: MATH 116 or a minimum 24 on ACT Math or 560 on SAT Math.

Required Textbooks: Essentials of Circuit Analysis and Lab Manual, Robert Boylestad, Pearson/Prentice Hall, 2004, ISBN 9780131603912

Required Materials:

Required Common (class meeting & laboratory) Supplies:

1)see "Course Operating Policies & Procedures" (COPP) for common base materials required for this course;
2)a scientific calculator {suggested calculator: TI Voyage200. Alternate calculators: TI-89, 86, 85 or HP49G+, 50G, or similar.} that must include but not be limited to:
   a) standard algebra & trigonometry,
   b) polynomial equation solving with complex roots,
   c) simultaneous equation solving with complex roots,
   d) mixed rectangular (a+ib) and phasor (M) calculations;
3) A scanner (your own or access to one) and software to scan your paper documents and save them in the ".pdf" file format.

Required Lab Supplies [required by start of 2nd week of lab]:

4)lab kit containing parts, safety glasses, and tools (available at FSU bookstore);
5)a toolbox or tackle box to store and organize lab components and materials:
   a) with several compartments to store parts and tools,
   b) small components should be stored in storage bins such that knocking over the toolbox does not scatter your parts– small self-contained storage units are recommended,
   c) removable data storage to take your data with you: USB drive or similar. Check the computer in the lab that you will be using to determine your choice of removable data storage. (try Kmart, Meijer, Staples, Walgreens, Wal-Mart, etc.)

Faculty: **Jeffrey Pedelty**

Student Learning Outcomes

1. Student will produce reports that fulfill the reporting requirements as specified in/for each selected laboratory exercise. The reports must also fulfill the requirements for a laboratory exercise report as presented in the course's policies and procedures document or similar.
2. Student will properly use basic component characteristics of an electrical source(s), resistor(s), capacitor(s), inductor(s), diode(s), transformer(s) and/or an active device(s) {Op Amp, BJT, FET} and/or a basic circuit law(s) and/or rule(s) {Ohm's Law, Kirchhoff's Voltage and Current Laws, the power rule, the voltage divider rule, the

current divider rule, component reduction equivalencies, source conversion, superposition, Thevenin's Theorem, and Norton's Theorem, max V,I,P transfer to load}, and known variable and/or parameter values to solve for a selected parameter or variable of the electrical circuit and/or a component in the following types of electronic circuits:
a. Amplifier systems: negative feedback, modeling and applying basic circuit analysis techniques, input and output resistance, transfer characteristic (voltage gain) , amplifier types (voltage).
b Comparator systems: with and without hysteresis, positive feedback, modeling and applying basic circuit analysis techniques

3. Student will demonstrate beginner's skill in breadboard based circuit construction (interpreting schematics), use the digital multi-meter (voltmeter, ammeter, ohmmeter), the o-scope/RLC meter to perform measurements and recognize meter-loading effects.

*Program Outcomes a, b, c, e, f, g, k are introduced in this course.

Course Outline including Time Allocation:

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LEC HRS	LAB HRS
I.	Introduction, orientation and safety	1	2
II.	Expressing numbers and metric prefixes	2	2
III.	Atoms, electric fields, charge and current	2	2
IV.	Energy, Work and Power	1	2
V.	Basic electric circuit	2	2
VI.	Power, efficiency and energy	1	2
VII.	Series circuits and Kirchhoff's Voltage Law	3	4
VIII.	Ground, voltage drops and node voltages	2	2
IX.	Parallel circuits and Krichhoff's Current Law	3	2
X.	Basic Series-Parallel circuits	2	2
XI.	Practical sources and source conversions	1	2
XII.	Superposition Theorem	1	2
XIII.	Thevenin's Theorem	1	2
XIV.	Maximum Power Transfer Theorem	1	2
XV.	Magnetic Fields and Hysteresis	2	2
XVI.	Electromagnetic Induction	1	2
XVII.	Capacitance	2	2
XVIII.	Inductance	2	2
XIX.	Sinusoidal waveforms	1	4
XX.	Pulse Waveforms	1	4
XXI.	Series RC Circuits	3	3
XXII.	Series RL Circuits	3	3
XXIII.	Basic Transformers	1	2
XXIV.	Rectification	1	2
XXV.	Unregulated filtered DC power supplies	1	4
TEST and REVIEW:		4	0
Totals		45	60

Course: EEET-122 Digital 1 (Required Course)

Credits:	4 credit hours
Contacts:	3 lecture hours, 3 lab hours
Course Description:	Study of basic digital concepts including logic gates, Boolean algebra, number systems, logic functions, flip-flops, counters, registers and memory devices. VHDL will be used with programmable logic devices to implement logic functions. Written and oral reports are an integral part of this course.
Course Prerequisites:	EEET-114
Course Outline:	The official course outline for this course can be located in the EET/CNS folder on the COET shared drive.
Required Textbooks:	Required - Digital Fundamentals with VHDL, Floyd, Prentice Hall, 2003, ISBN 0-13-099527-4 Required - Experiments in Digital Fundamentals with VHDL, Buchla and Joksch, Prentice Hall, 2003.
Course Web Site:	FerrisConnect
Required Materials:	**Required – BASYS2 FPGA Board from Digilent Inc.** **Required - Flash Drive for Program Storage**

Faculty: Prof. Ronald A. Mehringer

Student Learning Outcomes

1. Perform binary, decimal, and hexadecimal arithmetic.
2. Construct truth tables for logic circuits and Boolean expressions.
3. Utilize mapping techniques to simplify logic functions.
4. Analyze, design, implement, and troubleshoot combinational and register based logic circuits.
5. Understand the use of a hardware description language in logic specification.
6. Design and implement logic circuits using programmable logic devices.
7. Utilize manufacturer's data sheets to find and determine IC specifications.

*Program Outcomes a-g and k are introduced in this course.

Course Outline including Time Allocation

Week	Topic	Chapter	Homework
1	Introductory Digital Concepts	1	Homework #1
2	Number Systems, Operations and Codes	2	Homework #2
3	Logic Gates	3	Homework #3
4	Boolean Algebra and Logic Simplification	4	
5	Boolean Algebra and Logic Simplification		Homework #4
6	Combinational Logic	5	Homework #5
7	Functions of Combinational Logic	6	
8	Functions of Combinational Logic		Homework #6
9	Additional VHDL Topics and Applications	7	Homework #7
10	Flip-Flops and Related Devices	8	
11	Flip-Flops and Related Devices		Homework #8
12	Counters	9	
13	Counters		Homework #9
14	Shift Registers	10	Homework #10
15	Review		

Course: EEET 124 Electric Circuits 2 (Required Course)

Credits: 4 Hours
Contacts: 3 Lecture, 4 Lab Hours per Week
Course Description: A continuation of Electric Circuits 1. This course examines capacitance, inductance, RC circuits, RL circuits, transformer theory and applications, AC signals and waveforms, oscilloscopes, power supplies and higher level devices. The course approaches these topics from a systems viewpoint which emphasizes the application of basic concepts to actual circuits and devices.
Course Prerequisites: EEET 114 minimum grade C- and MATH 116 or a minimum 24 on ACT Math
Required Textbooks: Robert J. Herrick, DC/AC Circuits and Electronics: Principles & Applications, Delmar Learning, 2003 copyright, ISBN: 0-7668-2083-1

Kevin Taylor and Terry O'Connor, Lab Manual to Accompany DC/AC Circuits and Electronics: Principles & Applications, Delmar Learning, 2004 copyright, ISBN: 1-4018-8040-1 (second printing or later)

Faculty: Jeffrey Pedelty

*Program Outcomes a-g and k are introduced in this course.

STUDENT OUTCOMES (Students satisfactorily completing this course will achieve/complete/demonstrate …)	**ASSESS. METHOD**
Reports regarding Laboratory Exercises {ABET Criteria: a, f, g}: Student will produce reports that fulfill the reporting requirements as specified in/for each selected laboratory exercise. The reports must also fulfill the requirements for a laboratory exercise report as presented in the course's policies and procedures document or similar	Reports
Knowledge & Skill of Discipline's Theory Applied Primarily in Analysis. {ABET Criteria: a,f}: Student will properly use basic component characteristics of an electrical source(s), resistor(s), capacitor(s), inductor(s), diode(s), transformer(s) and/or an active device(s) {Op Amp, BJT, FET} and/or a basic circuit law(s) and/or rule(s) {Ohm's Law, Kirchhoff's Voltage and Current Laws, the power rule, the voltage divider rule, the current divider rule, component reduction equivalencies, source conversion, superposition, Thevenin?s Theorem, and Norton?s Theorem, max V,I,P transfer to load}, and known variable and/or parameter values to solve for a selected parameter or variable of the electrical circuit and/or a component in the following types of electronic circuits: a. Power supplies: rectification, filtering, regulation (zener), current limiting. b. Biasing circuits: BJT, op amp c. Amplifier systems: negative feedback, modeling and applying basic circuit analysis techniques, input and output resistance, transfer characteristic (current gain, transresistance, transconductance, voltage gain) , dependent sources, amplifier types (voltage, current, transconductance, transresistance), basic discrete BJT amplifier types (CE) as basic building blocks for the op amp. d. Wave shape generators: relaxation oscillator.	Tests

	e. DC transient in RC circuits: switching and square wave responses in RC circuits. f. AC responses: ac signal responses in RC, and transformer circuits.		
NO.	UNIT TOPIC DESCRIPTION SUMMARY	LEC HRS	LAB HRS
I.	Introduction, Orientation and Safety	1	2
II.	Resistivity, inductance and capacitance equations	2	6
III.	Sinewave and pulse waveform analysis	2	4
IV.	Harmonic analysis of non-sinusoidal waveform	1	2
V.	Oscilloscope theory and usage	1	6
VI.	Phasors and phasor algebra	2	0
VII.	Series RLC circuits	3	3
VIII.	Parallel RLC circuits	3	3
IX.	Series/Parallel conversion of RLC circuits	1	2
X.	Complex power and power factor	2	2
XI.	Resonance and bandwidth	2	2
XII.	AC source conversion	1	0
XIII.	Norton's Theorem - DC/AC circuits	2	0
XIV.	Thevenin's Theorem - AC circuits	1	2
XV.	Maximum Power Transfer Theorem - AC circuits	1	2
XVI.	Transformer reflected impedance and impedance matching	1	2
XVII.	Superposition in AC circuits	1	2
XVIII.	Solving simultaneous equations for two equations in two unknowns	1	0
XIX.	Mesh Analysis - DC and AC circuits	2	2
XX.	Nodal Analysis - DC and AC circuits	2	0
XXI.	Delta/Wye conversions - DC and AC circuits	2	0
XXII.	Decibels	1	0
XXIII.	Frequency selective filters and Bode plots	2	6
XXIV.	Universal charging / discharging equation and curves	2	0
XXV.	Pulse response of L.P./H.P. RC filters	1	4
XXVI.	Pulse response of L.P./H.P. RL filters	1	4
XXVII.	Basic computer program team project	0	4
XXVIII.	Tests and review	4	0
	Total	45	60

Course: EEET-210 Communication Circuits (Required Course)

Credits:	3 Hours
Contacts:	2 Lecture, 4 Lab Hours per Week
Course Description:	*Introduce students to the fundamentals of analog and digital electronic communication techniques. Specific topics include analysis of special circuits used in AM and FM receivers and transmitters as well as the introduction of modulation and demodulation methods. Digital communications methods including PWM, FSK and PSK will be explored. Basic telephony and DTV fundamentals will also be introduced. Emphasis will be placed on applied methods of transmission and reception.*
Prerequisites:	EEET-124 (minimum 70 required)
Required Textbooks:	Modern Electronics Communication, Gary M. Miller & Jeffrey S. Beasley, 9th edition, © 2007 Prentice Hall.
Required Materials:	Electronics kits and a bound, page numbered computational notebook (National 43-648 or equivalent) for lab.
Faculty:	**Professor Robert Most**

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. AM/FM modulation and demodulation
2. Digital modulation and demodulation methods
3. Oscillator and filter circuits
4. DTV fundamentals

*Program Outcomes a-g and k are reinforced in this course.

NO	UNIT TOPIC DESCRIPTION SUMMARY
I.	Introduction, Orientation, and Safety ▪ Know course goals, attendance policy and grading policy ▪ Know rules and safe operating procedures in lab ▪ Know lab work evaluation procedure
II.	Power supplies ▪ Know basics of theory, assembly and testing of typical communication system power supplies ▪ Know basics of theory, assembly and testing of typical regulators and special purpose diodes and filters
III.	Amplifiers ▪ Know basics of theory, assembly and testing of typical audio and RF amplifier circuits
IV.	Amplitude Modulation ▪ Know the basic idea of AM ▪ Be able to determine the percentage of modulation

V.	AM Receivers ▪ Know and understand the superheterodyne system ▪ Know and understand the assembly and testing of RF amplifiers ▪ Know and understand the assembly and testing of typical IF amplifiers ▪ Know and understand the assembly and testing of typical AM detectors ▪ Know the reason for and operation of AVC ▪ Know the techniques for demodulation of CW-SSB and the application of AGC
VI.	Antennas & Transmission Lines ▪ Understand the phenomenon of radio waves as they apply to communications ▪ Know the day and night effects of RF transmission ▪ Know what is meant by polarization of RF waves ▪ Know basic Hertz & Marconi antennas
VII.	Frequency Effects ▪ Know how to measure gain in terms of DBs ▪ Know how to measure amplifier response and what to do to change it ▪ Know how to determine bandwidth and what affects it ▪ Know what is meant by signal spectrum ▪ Know how to recognize and measure various types of distortion
VIII.	Oscillators and Timers ▪ Know the theory and assembly techniques of various sine wave oscillators ▪ Know the applications and operation of the 555 timer ▪ Know the techniques for achieving oscillator stability ▪ Know the frequency determining elements of basic oscillator circuits ▪ Be able to calculate the frequency of oscillator circuits
IX.	Frequency Modulation ▪ Know the frequency spectrum used for standard FM ▪ Understand theory of FM modulation ▪ Know the techniques for demodulation of FM signals ▪ Contrast the heterodyning process in FM receivers with that in AM ▪ Know why FM antennas look different than AM antennas ▪ Contrast the IF frequencies used in FM with those of AM receivers ▪ Understand why AFC is needed in FM receivers and the theory of it
X.	Printed Circuits ▪ Know good techniques of printed circuit board component assembly ▪ Be able to test and troubleshoot circuits assembled on PCB's.
XI.	Tests

Course: EEET-211 Electronics (Required Course)

Credits: 3 Hours

Contacts:	2 Lecture, 3 Lab Hours per Week
Course Description:	*This course expands the basics of the bipolar junction transistor in multistage amplifier circuits, with specific emphasis on input and output impedance relationships. Exploration of JFETs, power MOSFET and thyristor applications will be studied. The application of the differential pair in operational amplifier architecture and operational parameters will be explored. The course will culminate in a semester design project that involves designing a real amplifier that will be built and demonstrated.*
Course Prerequisites:	EEET-124 (minimum 70 required)
Required Textbooks:	Electronic Principles, Malvino, 7th edition, © 2006 McGraw-Hill.
Required Materials:	Electronics kits and a bound, page numbered computational notebook (National 43-648 or equivalent) for lab.

Faculty: Professor Robert Most

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. BJT biasing / operation
2. MOSFET biasing / operation
3. Analysis and design of multistage amplifiers
4. Operational Amplifier parameters

*Program Outcomes a-g and k are reinforced in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LEC HRS	LAB HRS
I.	Introduction A. Know and follow course operating procedures - safety	1	
II.	Multitransistor Circuits A. Recognize, analyze differential pairs B. Recognize, analyze emitter coupled logic C. Recognize, analyze differential amplifiers with active loads D. Recognize, analyze Class B, AB amplifiers E. Utilize IC power amplifiers	2	6
III.	The D-MOSFET: Depletion Mode MOSFET A. Know what a D-MOSFET is and how it works B. Know how to bias a D-MOSFET C. Know how to operate a D-MOSFET as a switch D. Know the small signal and Cascode forms of amplifiers E. Recognize the Dual Gate MOSFET	2	6

IV.	The E-MOSFET: Enhancement Mode MOSFET A. Know what an E-MOSFET is and how it works B. Know how to bias an E-MOSFET C. Know how to operate an E-MOSFET as a switch and how it is used in digital logic circuits D. Know the small signal and IC forms of amplifiers	2	6
V.	Ideal Analog Amplifiers A. Know transfer characteristics B. Know linear voltage & current amps. C. Know linear R & G amps	6	6
VI.	Operational Amplifier A. Know the Ideal op amp. B. Know the inverting, summing, non inverting amps. C. Know the differential amps. D. Know their frequency effects E. Know types of Op amps F. Know departure of real Op amps from ideal	6	6
VII.	Some operational Amplifier & IC Applications A. Know the integrating, low pass, high pass, band pass filters B. Know the voltage comparators C. Know the Schmitt Triggers D. Know the Transition time limitations	7	12
VIII.	Test	4	3
	Total Hours	30	45

Course: EEET 212 Digital 2 (Required Course)

Credits:	4
Contacts:	3 Hours of Lecture, 2 Hours of Lab
Course Description:	Study of basic digital concepts including logic gates, Boolean algebra, number systems, logic functions, flip-flops, counters, registers and memory devices. VHDL will be used with programmable logic devices to implement logic functions. Written and oral reports are an integral part of this course.
Course Prerequisites:	EEET-112
Required Textbooks:	Digital Fundamentals with VHDL, Floyd, Prentice Hall 2003 ISBN 0-13-099527-4 Experiments in Digital Fundamentals with VHDL, Buchla and Joksch, Prentice Hall, 2003.
Required Materials:	BASYS FPGA Board from Digilent Inc.; Calculator (binary functions helpful); Flash Drive for Program Storage
Faculty:	**Associate Professor Ron Mehringer**

Student Learning Outcomes

Outcome #1: Demonstrate a knowledge of advanced digital theory
Outcome #2: Demonstrate an overall knowledge of the theory and application of digital circuits.
Outcome #3: Demonstrate an application of digital theory to simulated and actual digital logic circuits

*Program Outcomes a-g and k are reinforced in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LEC HRS	LAB HRS
I.	Digital I Overview Explain what a digital system is Describe basic digital functions.	3	6
II.	IC Technologies Learn basic characteristics and parameters. Identify parameters using the databook. Describe characteristics of TTL. Describe characteristics of CMOS. Interface IC's of different logic families.	6	3
III.	System Interface – Concepts Explain what is meant by System Interface. Recognize interface applications.	1	0
IV.	System Interface - D/A Conversion Explain the concept of a D/A converter. Build, Analyze, and troubleshoot D/A circuits.	3	3
V.	System Interface - A/D Conversion	3	3

	Explain the operation of a flash, counting, single slope, dual slope, and successive approximation A/D converters. Build, analyze, and troubleshoot A/D circuits. Combine the concepts of A/D and D/A.		
VI.	System Interface – Applications Determine converter specifications from databooks. B. Apply knowledge of converters to given applications.	2	0
VII.	System Interface - Data Bus Concepts	1	0
VIII.	System Interface - Standard Busses and Drivers Identify standard bus types and applications. 2. Explain the operation of GPIB, RS323, S-100, ISA, etc. 3. Understand bus limitations and specifications. 4. Specify driver devices for given bus application. 5. Explain operation and advantages of driver devices	4	6
IX.	Microprocessor – Introduction Explain the basic components of a microprocessor. Explain the components of a microprocessor system. Understand register usage in a microprocessor. Explain the sequence for a read/write operation. Explain the basic operation of a microprocessor. Understand the concept of a microprocessor interrupt. Explain DMA and its advantages.	3	3
X.	Microcontrollers – Overview Differentiate between a microprocessor and a microcontroller. Recognize the basic components of a microcontroller. Recognize the difference between different microcontrollers.	3	0
XI.	Microcontrollers – Specifics Explain the major internal components. Determine internal memory and port configuration. Understand how I/O is implemented. Explain what stack memory is. Learn basic software instructions.	8	15
XII..	Computer Memory ROM/PROM, RWM/RAM, Memory Expansion, Memory Types, PLD's, Magnetic/Optical	6	6
	Tests (2 excluding the final)	2	0
	Total Hours	45	45

Course: EEET 214 Advanced Electric Circuits (Required Course)

Credits: 3 Hours
Contacts: (2 Lecture Hour and 3 Lab Hours)/Week
Course Description: This course will address basic AC circuit concepts including waveforms, phasors, series and parallel circuits, resonance, transformers and filters. Application of methods of analysis, theorems and power calculations will be investigated.
Course Prerequisites: EEET 124 and MATH 126

Required Textbooks: Advanced AC Electronics: Principles & Applications, Jacob, Thomson/Delmar Learning, 2004, ISBN 0-7668-2330-X

R**equired Materials:**

1. See "Course Operating Policies & Procedures" (COPP) for common base materials required for this course
2. A scientific calculator that must include but not be limited to:
    a. standard algebra & trigonometry,
    b. polynomial equation solving with complex roots,
    c. simultaneous equation solving with complex roots,
    d. mixed Cartesian\rectangular (a+ib) and phasor (r∠θ) calculations:
        i. Recommended: TI Voyage 200,
        ii. alternate Recommendations, TI-89, HP-50g, HP-48gII.
3. A scanner (your own or access to one) and software to scan your paper documents and save them in the ".pdf" file format.
4. Required Lab Supplies [required by start of 1st lab]
    a. EECN lab kit containing, safety glasses, and tools (available at FSU bookstore for EEET-114/124);
    b. A toolbox or tackle box to store and organize lab components and materials (Lowes, Kmart, Meijer's, Menards, Wal-Mart, etc.):
        i. with several compartments to store "stuff" and tools,
        ii. small components should be stored in storage bins such that knocking over the toolbox does not scatter your "stuff"– small self-contained storage units are recommended.

Faculty: Prof. Warren Klope

Student Learning Outcomes

Upon completion of each instructional unit, the learner will be able to satisfactorily:

The student must be able to demonstrate a knowledge and understanding of AC Circuit Theory.
The student must be able to demonstrate a knowledge and understanding of the generation, application and circuit analysis of three phase power systems.
The student must be able to apply AC Circuit Theory by performing lab experiments.

The student must be able to apply AC Circuit Theory by performing lab experiments.

*Program Outcomes a-g and k are reinforced in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY
1	Course Introduction and Sinusoidal Waveforms
2	Phasors
3	Impedance
4	Series Circuits, R, RL, RC, RLC
5	Parallel Circuits, R, RL, RC, RLC
6	Filter Terminology and Theory
7	Low-pass Filters
8	High-pass Filters
9	Band-pass Filters and Resonance
10	Amplifier Frequency Response
11	Superposition
12	Fourier Series of Non-Sinusoidal Waveforms
13	Circuit Analysis of Non-Sinusoidal Waveforms
14	Mesh and Nodal Analysis
15	Three-phase Power and Transformers
16	Exams
	Total Hours

Course: EEET-221 Troubleshooting (Required Course)

Credits: 3 Hours

Contacts: 2 Lecture, 3 Lab Hours per Week

Course Description: *Troubleshooting of Electronic Circuits covers the detailed analysis of passive and active circuit failure modes, as well as component level diagnostics. The philosophy, approach and methodologies of troubleshooting will be emphasized. Lab work will closely follow lecture.*

Course Prerequisites: EEET 211, EEET 212, EEET 210 (Minimum 70 required in each course)

Required Textbooks: Electronics Troubleshooting, Fabian J. Lahue, © 1994 Glencoe / McGraw-Hill

Required Materials: Electronics kits and a bound, page numbered computational notebook (National 43-648 or equivalent) for lab.

Faculty: **Professor Robert Most**

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. Failure mode(s) and identification of faulty passive components
2. Failure mode(s) and identification of faulty active components
3. Troubleshooting of multistage analog and digital circuitry
4. Troubleshooting of radio frequency circuitry

*Program Outcomes a-g and k are reinforced in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LECTURE HOURS	LAB HOURS
I.	Passive device failure and identification	8	9
II.	Active device failure and identification	5	6
III.	Multistage troubleshooting of analog and digital systems	10	21
IV.	Radio Frequency circuit troubleshooting	4	6
	Total Hours	27	42

Course: EEET-222 Microprocessor Applications (Required Course)

Credits:	4 Hours
Contacts:	3 Lecture, 2 Lab Hours per Week
Course Description:	*As a continuation of Digitals II, this course will expand the concepts of microprocessor systems and assembly language. Advanced concepts such as subroutines, interrupts and hardware interfacing will be emphasized. Emulation tools and debugging will also be explored in laboratories. A semester design project will span the gamut of hardware and software integration for real-world applications.*
Course Prerequisites:	EEET 122, EEET 212 (Minimum 70 required in each course)
Required Textbooks:	Software and Hardware Engineering: Assembly and C Programming for the Freescale HCS12 Microcontroller, Frederick M. Cady, 2nd Edition, ISBN-13: 978-0195308266
Required Materials:	Electronics kits for lab.
Faculty:	**Professor Robert Most**

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. CISC based Von Neumann architecture using machine language
2. Assembly language via various addressing modes of the microprocessor
3. Software control of microprocessor input / output including A/D conversion
4. Stack manipulation using subroutine functions and interrupt control

*Program Outcomes a, b-g and k are reinforced in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LEC HOURS	LAB HOURS
I.	Introduction and orientation to course 1. Know and understand course goals, attendance and grading policy. 2. Know and understand safe lab procedures. 3. Know and understand and demonstrate the practice of proper electrostatic discharge (ESD) technique in the lab.	1	1
II.	Microcontroller Architecture review 1. Review Microcontroller hardware configuration. 2. Review various counter and timer functions. 3. Review Serial Data I/O arrangement. 4. Review Interrupt structure.	2	0
III.	Microcontroller System review 1. Single-Board computer hardware/ interfacing. 2. SBC monitor program.	2	2

IV.	Assembly Language programming 1. Know and understand basic assembly language development processes - creation, assembly, editing, linking, debugging. 2. Be able to differentiate between addressing modes. 3. Know and utilize data movement instructions. 4. Know purpose and use of logical/boolean instructions. 5. Know how to use arithmetic instructions. 6. Know different uses of jump and call instructs.	12	12
V.	Interfacing and System Hardware Design 1. Know microcontroller interface/timing specs. 2. Be able to decode external memory space. 3. Know how to expand I/O space. 4. Know how to incorporate speed and timing considerations into design problems.	3	3
VI.	Interfacing and System Software Design 1. Write different types of timing subroutines. 2. Know and utilize RAM/ROM testing techniques. 3. Know how to construct lookup tables. 4. Know and utilize serial data programming techniques.	3	3
VII.	Input sensing and Transducing Devices 1. Know and understand usage of various sensing devices. 2. Interface keyboard and other switching devices. 3. Review various A/D interfacing devices.	6	6
VIII.	Output Control and Transducing Devices 1. Know how to setup various types of displays. 2. Review various D/A interfacing devices.	6	6
IX.	Interrupt Control 1. Know and utilize various interrupt control tec. 2. Know and be able to utilize various multiple interrupt hardware devices.	6	3
	Project Development 1. Know and utilize software production tools. 2. Know and utilize emulation tools 3. Be able to use process simulation techniques.	0	6
X.	Tests and lab practical	4	3
	Total Hours	45	45

EEET – 224 Industrial Automation Controls and Motors (Required Course)

Credits: 4 (3 + 3)

Prerequisite: EEET – 124

Instructor: Gareth Todd, Associate Professor

Lecture Text: Electric Motors and Control Systems 1st Edition, Petruzella, Frank, McGraw Hill, 2010, ISBN: 978-0-07-352182-4

Materials: Pencils, Paper, Calculator, Flash Drive.

Lab Manual: Programming the Control Logix Programmable Automation Controller Using RSLogix 5000 Software 2nd Edition, Dunning, Gary, Delmar Publishing, 2012, ISBN: 978-1-4018-8432-1.

Description: An introduction to industrial motor control systems covering electrical control devices and systems integration. A study of the fundamentals of industrial control components and systems including relays, sensors, actuators, motors, and motor controls, three-phase power, timers, counters, and other parts of devices in automation systems. The course also includes the study of programmable logic controllers, PLCs, their input and output devices, applications and programming. Also covered is ladder logic, electrical schematics, electrical standards, electrical safety codes and standards.

Objectives:

1. Understand the specifics of electrical control components and how they are incorporated into a control system including: transformers, power supplies, fuses, disconnects, circuit breakers, switches, sensors, actuators, relays, solenoids, timers and counters.
2. Be able to demonstrate the ability to read and draw relay ladder logic and schematic diagrams.
3. Understand the principles of single and three-phase power sources.
4. Be able to apply motors, motor starters, and motor drives both single and three-phase.
5. Understand the inputs and outputs of a PLC, their symbols and PLC's I/O diagrams.
6. Understand the basics of PLC's and their instruction language.
7. Be able to program PLC's, including timers and counters.
8. Demonstrate the ability to incorporate PLC's as a control system.
9. Learn some of the standards, codes and safety requirements for control systems.

*Program Outcomes a, b-g and k are reinforced in this course.

Course Outline

All Chapters shown below are from the required textbook by Frank Petruzella or the Lab Manual by Gary Dunning. A "P" next to the chapter number refers to the Petruzella text. A "D" next to the chapter number refers to the Dunning Lab Manual.

Week/Lec	Topic	Chapter	Homework
1/1	Introduction/Safety	1P	
1/2	Electrical Drawings	2P	Homework #1
2/1	Ladder Diagrams	2P	
2/2	Relays	7P	Homework #2
3/1	Motor Control Devices	4P	Homework #3
3/2	Programmable Controllers	1D	Homework #4
4/1	Programmable Controllers	2D	
4/2	Ladder Logic Programming	4D and 10(Part 4)P	
5/1	**EXAM 1**		
5/2	Motor Transformers & Dist. Systems	3P	Homework #5
Week	**Topic**	**Chapter**	**Homework**
6/1/2	ControlLogix Addressing	5D	
7/1/2	Input/Output Devices	6D	Homework #6
8/1/2	CompactLogix I/O Configuration	7D	Homework #7
	Spring Break		
9/1	Contactors and Motor Starters	6P	Homework #8
9/2	**EXAM 2**		
10/1	Motor Control Circuits	8, 9P	Homework #9
10/2	Creating Tags in Logix 5000	8D	Homework #10
11/1/2	Basic Instructions	10D	Homework #11
12/1/2	Motors	5P	Homework #12
13/1/2	Variable Speed Drives	10 (Part 1-3)P	Homework #13
14/1	Timer Instructions	11D	
14/2	**EXAM 3**		
15/1	Magnetics	Handout	Magnetics Homework
15/2	Review		
16	**FINAL EXAM** (Date determined by university schedule)		

EEET-313 Electrical Power and Machines (Concentration Elective Course)

Prerequisite: EEET-224 or EEET-301

Credits: 4 (3 + 3) 3-Lecture and 3 Lab hours per week

Instructor: Gareth Todd, Associate Professor

Lecture Texts: Electrical Machines, Drives, and Power Systems, 6th, Wildi Prentice-Hall
ISBN-10: 0131776916 • ISBN-13: 9780131776913

Pocket Book of Technical Writing for Engineers and Scientists, 3rd, Finkelstein, McGraw-Hill
(ISBN: 0073191591)

Lab Manual: Hampden Lab Manual (Not Available Online – Only sold at the local bookstores)

Description: This course is an in-depth study of power, motors and generation. Types include DC motors, AC single, poly-phase, induction, and synchronous motors. Other studies will include three-phase circuits and transformers, power factor, machine efficiency and heating, and power distribution.

STUDENT OUTCOMES (Students satisfactorily completing this course will achieve/complete/demonstrate …)
Outcomes #1: To learn the various types and characteristics of motors and generators
Outcomes #2: To gain expertise in various types of transformers and power distribution
Outcomes #3: To gain understanding of 3 phase circuits and configurations
Outcomes #4: To utilize mathematic knowledge and skills to determine and power factor, motor operating and transformer characteristics, and generator principles
Outcomes #5: To achieve an understanding of what is necessary to communicate technical information effectively in written format

*Program Outcomes a-h and k are reinforced in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LEC HRS	LAB HRS
I.	Introduction to Automation and Safety	1	1
II.	Magnetic Circuits	6	5
III.	DC Power Generation	5	10
IV.	DC Motor Operation	4	8

V.	Efficiency and Heating of Machines	2	0
VI.	Power and Power Factor	3	0
VII.	Three-Phase Circuits	3	0
VIII.	Transformers	7	9
IX.	Three-Phase Induction Motors	6	9
X. & XI	Synchronous Generators and Motors	3	3
XII.	Single-Phase Motors	1	0
XIII.	Power Electronics	3	0
	Tests	3	0
	Total Hours	45	45

TITLE: EEET 321, Network Analysis (Required Course)

CREDITS/CONTACTS: 3 Credit Hours (3 hours lecture)

PREREQUISITE: EEET 124, Math 226

INSTRUCTOR: Gareth Todd, Associate Professor

TEXTBOOK: Network Analysis with Applications, 4th Ed., Stanley, Prentice-Hall, 2003 (ISBN: 0130602469).

REFERENCES: Automatic Control Systems & Components, Carstens, Prentice-Hall, 1990

MATERIALS: Scientific Calculator (capable of integrations and differential equations)

DESCRIPTION: Course builds on DC and AC theory. Covers derivative and integral relations for capacitive and inductive components; transient and steady state solutions with differential equations; initial and final conditions; first and second order circuits characterized by responses. Lapalce Tranforms as a tool for solving linear networks and determining stability of control systems. Use of transfer functions to describe input/output relations. Review of Bode Plots and the introduction of Fourier Analysis.

STUDENT OUTCOMES (Students satisfactorily completing this course will achieve/complete/demonstrate …)
1. Differential Equation of System: The student will complete an analysis of a system or circuit using instantaneous values for the variables of the system that results in a differential equation with initial conditions that models the behavior of a desired variable of the system.
2. Solving of Differential Equations with primary emphasis on using the Laplace Transform method: a student will solve the typical differential equations encountered in Technology where the Laplace solution methods used.
3. Transfer Functions: 4. The student will have the ability to solve and analyze transfer functions up to and including Second Order systems to a Step Response.
5. Bode Plots: 6. The student will interpret Bode Plots and use them in analysis of systems and circuits.
7. Fourier Series: 8. The student will demonstrate how to express non sinusoidal waveforms as combinations of sinusoidal waveforms using the Fourier Series and understand how to use this in the performance analysis of a system or circuit.

*Program Outcomes a, d, f and k are mastered in this course.

UNIT TOPIC DESCRIPTION SUMMARY	**LEC HRS**

Introduction and orientation to course.	**1**
Review of Circuit Principles	4
DC and AC characteristics of components	
Basic circuit laws in linear circuits	
DC transient and AC steady state response of linear circuits	
Gen Linear Components	
The block: i/o relations and transfer functions	6
Gain, bandwidth, linearity	
Summers, feedback, sample control system examples	
Calc Review	
Derivative and integral circuit laws	3
The differential equation	
Solving the First Order Differential Equation	3
The Laplace Transform of a time function	
How to transform the Diff Eq into Laplace and finding solution	
How to use Transform Impedances to solve circuits	
How to transform a transfer function and determine the output of a block	
Modeling Control system components	
The behavior of a sensor : 1st order model (steady state gain and t)	3
The types of sensors	
The servomotor	
Block Diagram Mathematics	
How to combine blocks in cascade	
How to eliminate loops	
How to reduce diagram to single transfer function	3
Bode Techniques	
How to use Bode approximations	
How to graph complex functions	
How to determine system stability	3
How to construct a closed loop plot	
Advanced Laplace Techniques	
How to construct and solve a second order model	
The second order response	
The root locus technique	6
S-plane stability criteria	
System Design Techniques and Examples	
Tests and Reports	
	45 total

EEET 323 Industrial Automation Controls (Concentration Elective Course)

Credits: 4 Credit Hours (3 lecture hours + 3 lab hours per week)

Prerequisite: EEET – 224, or EEET – 301

Instructor: Gareth Todd, Associate Professor

Lecture Text: Programming ControlLogix® Programmable Automation Controllers, Stenerson, Jon, Prentice-Hall, Upper Saddle River, NJ, (2010) ISBN: 13: 978-1-4354-1947-6

Lab Manual: Provided on FerrisConnect, handout, or verbal instruction

Description: Advanced topics in PLC and process control for EEET students in the industrial automation concentration or Industrial Automation Minor. Includes an introduction to PLC's, ladder logic diagrams, Sequential Function Chart programming, sensors, pneumatics, motors, machine control, and low voltage power distribution.

STUDENT OUTCOMES (Students satisfactorily completing this course will achieve/complete/demonstrate …)
Outcomes #1: To learn to work under industrial timelines
Outcomes #2: To control automated machinery using a PLC
Outcomes #3: To understand basic fluid power circuits and components
Outcomes #4: To understand various types of motor and machine control
Outcomes #5: To understand various types of low voltage power distribution

*Program Outcomes a-h and k are reinforced in this course.

Course Outline including Time Allocation:

TOPICS	LEC HRS	LAB HRS
Introduction to Communication Foundations, Data Representations, Standards	3	3
DeviceNet, Review CLogix Language, Protocols	3	3
OSI versus TCP Models, DNet Communications and DeviceNet Cable Systems	3	3
Data Transmission DeviceNet and Installation Procedures	3	3
Transmission Impairments; ControlNet Introduction and Architecture	3	3
Communication Media, ControlNet	3	3
Data Encoding: Digital Data and Signals and Digital Data and Analog Signals	3	3
Ethernet/IP	3	3

Interfacing: Data Link Standards EIA/TIA Standards, RS232, RS339, RS422, RS 423, RS485, RS 530, Network Layers	3	3
Data Link Control: Error Control, High Level Data Link Control, Using Half Duplex Protocol	3	6
Statistical TDM, ADSL, xDSL, D.L. Layer Message Frames	3	0
Local Area Networks, Terminology, Industrial Networks and Applications, Modbus RT, Highway Remote Addressable Transducer	3	6
Industrial Networks and Applications, Legacy Networks, Other Networks	3	3
Process Control Networks	3	3
Industrial Presentation and Review for Final	3	0

Title: **EEET 325 - PC Data Acquisition & Control (Required Course)**

(2hrs lect.+3hrs lab) = 3 Credits

Prerequisites: EEET 122 with a minimum grade of C- and EEET 124 mimimum grade of C-

ctor:

ssor Warren Klope,

Books: "Introduction to Data Acquisition with LabVIEW- 2ndEdition, RobertH.King,McGrawHill, ISBN:978-0-07-338587-7

Learn LabVIEW 2012 Fast – A Primer for Automatic Data Acquisition. Douglass

Stamps, Ph.D., SDC Publishing, ISBN:978-1-58503-850.3

Description: An introduction to data acquisition (DAQ), control, analysis, and presentation using the graphical programming language LabVIEW. Sensors, transducers and signal conditioning are introduced. The means by which acquired data is input to a computer is introduced: including GPIB, serial devices, and plug-in DAQ boards. LabVIEW is the means to provide control, analysis of data (in both real time and post process) and present the associated information in an end user friendly format.

Outcomes:

Upon completing this course, student should be able to:

1) Develop an applications understanding of Op Amps
2) Analyze techniques for analog signal conditioning
3) Become familiar with various types of sensors
4) Understand how a personal computer can be used in a data acquisition application
5) Understand how a personal computer can be used in a control application.

*Program Outcomes a, b-g and k are reinforced in this course.

Unit	Description	Objectives	Lec Hrs	Lab Hrs
Part 1:	Learning LabVIEW:	Chapter 1 Introduction (week 1) Chapter 2 The LabVIEW Environment (week 1) Chapter 3 Data Acquisition (week 2) Chapter 4 Basic DAQ Software Design & Flow Control (week 3) Chapter 5 DAQ State Machines (week 4) Chapter 6 Arrays (week 5) Chapter 7 Input and Output (week 6) Chapter 8 High Frequency DAQ (week 7) Chapter 9 Summary (week 8)	16	24
Part 2:	Instrumentation: Sensors, Transducers and LabVIEW	Overview of Automation Signal Conditioning with op-amps Op amps I-to-I, I-to-V, V-to-I, and V-to-V converter ckts. Sensors Overview: force, pressure, displacement, velocity, acceleration, flow, temperature Lab Project – Design and build a signal conditioning system from sensor to 4-20ma transmission to 0-10V controller input.	4	8
Part 3:	Project (all 15 weeks- last 4 weeks exclusively)	Student Project	8	12
Eval	Evaluations	Test 1 over LabVIEW (March 01st @ SWN408) Test 2 over Instrumentation (April 3rd @ SWN408) Project Report? (last lecture and/or finals day) Finals Day (May 12th @ 6-7:40 pm @ SWN408)	2	0
		Total Hours	30	45

Course: EEET-357 Advanced Electronics (Concentration Course)

Credits: 3 Hours

Contacts: 2 Lecture, 4 Lab Hours per Week

Course Description: *As a continuation of EEET-211, advanced concepts in electronics will be covered impacting energy conversion, hybrid drive and green energy applications. Emphasis will be placed on circuits in motor control, photovoltaic and battery charging technologies. This includes DC/DC converters (Buck, Boost, Flyback, Inductorless), AC inversion, H-Bridge applications and PWM circuits including class-D amplifiers.*

Course Prerequisites: EEET-211 and EEET-222 (minimum 70 required on all prerequisites)

Required Textbooks: Electronic Principles, Malvino, 7th edition, © 2006 McGraw-Hill.

Required Materials: Electronics kits and a bound, page numbered computational notebook (National 43-648 or equivalent) for lab.

Faculty: Professor Robert Most

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. Design Power MOSFET circuits based on key MOSFET parameters
2. Apply DC/DC converter concepts to energy conversion circuits
3. Apply H-Bridge PWM concepts to motor control and amplifiers
4. Design battery charging strategies for specific battery technologies

Course Schedule

Fall 2010 Events Schedule EEET-390						
Week		Date	Assignment	Due	Last day to turn in for credit	Comments
1	M	30-Aug				
	W	1-Sep	Homework #1			
	F	3-Sep				
2	M	6-Sep				
	W	8-Sep	Homework #2 / Lab #1	Homework #1		
	F	10-Sep				
3	M	13-Sep				
	W	15-Sep	Homework #3 / Lab #2	Homework #2 / Lab #1		
	F	17-Sep				
4	M	20-Sep				
	W	22-Sep	Homework #4 / Lab #3	Homework #3 / Lab #2	Homework #1 - #3, Lab #1	Solutions Distributed
	F	24-Sep	**TEST #1**			
5	M	27-Sep				
	W	29-Sep	Lab #4	Lab #3	Lab #2	
	F	1-Oct				
6	M	4-Oct				
	W	6-Oct	Homework #5 / Lab #5	Homework #4, Lab #4	Lab #3	
	F	8-Oct				
7	M	11-Oct				
	W	13-Oct	Homework #6 / Lab #6	Homework #5, Lab #5	Lab #4	
	F	15-Oct				
8	M	**18-Oct**				
	W	20-Oct	Homework #7 / Lab #7	Homework #6, Lab #6	Homework #4 - #6, Lab #5	Solutions Distributed
	F	22-Oct				
9	M	25-Oct				Mid Term Grades Due 9AM
	W	27-Oct	**TEST #2**, Lab #8	Lab #7	Lab #6	
	F	29-Oct	Advisory Meeting			
10	M	1-Nov				
	W	3-Nov	Homework #8 / Lab #9	Homework #7, Lab #8	Lab #7	Last day for 'W' Grade
	F	5-Nov				
11	M	8-Nov				
	W	10-Nov	Homework #9 / Lab #10	Homework #8, Lab #9	Lab #8	
	F	12-Nov				
12	M	15-Nov				
	W	17-Nov	Homework #10 / Lab #11	Homework #9, Lab #10	Homework #7 - #9, Lab #11	Solutions Distributed
	F	19-Nov	**TEST #3**			
13	M	22-Nov				
	W	24-Nov	Thanksgiving Holiday >>>>>>>>>>>>>>>>>>>>>>>>			
	F	26-Nov	Thanksgiving Holiday >>>>>>>>>>>>>>>>>>>>>>>>			
14	M	29-Nov				
	W	1-Dec	Lab #12	Lab #11	Lab #10	
	F	3-Dec				
15	M	6-Dec				
	W	8-Dec		Homework #10, Lab #12	HW #10, Lab #11,12	
	F	10-Dec				
16	M	13-Dec	<<<<<<Finals Week>>>>>>>			
			Note: Lab books and homework are due at beginning of class period.			

EEET 393 Internship (Required Course)

Credits: 4 Hours

Contacts: 0 Lecture, 0 Lab Hours per Week

Course Description: Industrial experience where students can apply their previously learned skills for the mutual benefit of the intern and the employer (400 hours minimum). Weekly activity reports are required during the internship, as well as a mid-term and final formal report. Employers also submit a performance report on the intern. Students are required to complete a cover letter and resume' prior to seeking the internship.

Course Prerequisites: Department Approval.

STUDENT OUTCOMES (Students satisfactorily completing this course will achieve/complete/demonstrate …)
Outcome #1: Describe the activities of the internship or write a proposal for a research paper
Outcome #2: The student shall be evaluated by his/her supervisor or submit a rough draft of the research paper.
Outcome #3: Describe the company and internship employment or complete a research paper.

*Program Outcomes a-k are mastered in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LECTURE HOURS	LAB HOURS
I.	Introduction and Scope of Internship 1. Knowledge of the course goals, attendance and grading policies.		1
II.	Writing of resume' and cover letter 1. Review basics of resume' and cover letter 2. Knowledge of resume' content 3. Knowledge of resume' layout 4. Knowledge of cover letter content		1
III.	Obtaining Internship Placement 1. Knowledge of where/when to start 2. Know how to obtain an interview 3. Know how/when to follow-up		

IV.	Internship Work Experience 1. Work experience at an industry		
V.	Feedback with student while on Internship 1. Writing of weekly reports 2. Evaluation of Employer 3. Evaluation of reports by coordinator		400

EEET – 414 Industrial Process Communications (Concentration Elective Course)

Prerequisite: EEET 323 and enrolled as a senior
Credits: 4 (3 lecture hours + 3 lab hours)
Instructor: Gareth Todd, Associate Professor
Lecture Text: Data & Computer Communications, 10th edition, Stallings, William, Prentice-Hall Publishing (ISBN-13: 978-0-13-350648-8)
Reference Material: Supplements from vendor catalogs and Internet sources.
Lab Manual: Electronic or Handout

Description: Fundamentals of industrial Process Communications are presented. A foundation in transmission media and standard are reviewed. A heavy emphasis is given on Industrial control networks and applications. PLC to PLC, PLC to MMI, PLC to SCADA, PLC to Remote I/O, PLC to Motion Controllers, PLC to Sensors, PLC to Devices, and PLC to PC communications are emphasized, connected and tested.

STUDENT OUTCOMES (Students satisfactorily completing this course will achieve/complete/demonstrate …)
Outcomes #1: To understand basic principles of industrial process communications
Outcomes #2: To understand network definitions and concepts
Outcomes #3: To have a working knowledge of DeviceNet, ControlNet and EtherNet/IP
Outcomes #4: To have a working knowledge of different media
Outcomes #5: To understand popular plant networks
Outcomes #6: To perform PLC to PLC, PLC to HMI, and PLC to PC communications
Outcomes #7: To understand the concepts of MMI, SCADA programming and industrial Windows

*Program Outcomes a-h and k are mastered in this course.

Week	Lect. № Lecture Subject	Text Sect./Pgs	Comments/Hwk.
1	1. Intro to Course and Expectations. 2. Intro to Comms, Foundations, Data Representations, Standards. RSLinx communications	Ch. 0 /2-6 Ch. 1 /10–31	Rcmd. Read.
2	1. Introduction to DeviceNet, Review CLogix Language 2. Protocols and Architect. CIP, Version 17 CLogix	Suppl. Ch. 2 32–42, Suppl.	Handout
3	1. OSI vs. TCP Models, DNet communications 2. DeviceNet Cable System	Ch. 2 42–54, Suppl. Supplements	Quiz
4	1. Data Transmission DeviceNet 2. DeviceNet Installation procedures	Ch. 3 / 62–86 Supplements	 Handout
5	1. Transmission Impairments, ControlNet intro. 2. ControlNet Architecture, ControlNet Determinism/Rpt.	Ch. 3 / 86–96 CNet Comm. Module Ch. 1-3	 Handout
6	1. Communication Media, ControlNet **2. Exam 1**	Ch. 4 /102–116, ControlNet Comm.	Wired Only Handout **Lab Report 1 Due**

		Module Ch. 5-6	
7	1. Data Encoding: Digital Data & Signals. 2. Data Encoding: Digital Data & Analog Signals.	Ch.5 pp.139–151 Ch.5 pp.151–168	
8	1. Ethernet/IP. 2. Data Communication Interface: Asynchronous & Synchronous Transmissions, Error Detection and Correction Line Configuration, Ethernet/IP	Suppl. Ch.6 pp172–192 /Suppl.	Handout Handout
9	1. Interfacing: Data Link Standards EIA/TIA Standards, RS-232, RS 449, RS-422, RS-423, RS-485, RS-530, Network Layers. Ethernet/IP Comparison/Determinism 2. Data Link Control: Flow Control, Error Control/CRC, Understanding DF1 Protocol.	Ch.6 pp.193–203 Ch.7 pp 208–215 DF1 Protocol Ch. 2	Handout
10	1. Data Link Control: Error Control, High Level Data Link Control, Using Half Duplex Protocol. 2. Multiplexing: FDM, Sync. TDM, 2.0 Using Full Duplex Protocol.	Ch.7 pp215–228 DF1 Protocol Ch. 3 Ch. 8 pp 242 – 259 DF1 Protocol Ch. 4	**Lab Report 2 Due**
11	1. Statistical TDM, ADSL, xDSL, D.L. Layer Msg. Frames 2. **Exam 2**.	Ch. 8 pp 260 – 272	Handout
12	1. Local Area Networks, Terminology – Broadcast, Baseband, Bandwidth Characteristics, 10Base2, 10Base5, 100BaseT, Control Networks 2. Industrial Networks & Applications, Modbus RT, Highway Remote Addressable Transducer (HART), Fieldbus Technology, ControlNet Extra “hop” and Comms..	Ch. 13 pp 425–447 Ch.15 pp 530–560	Handout
13	1. Industrial Networks & Applications, Legacy Networks, Other Networks - (Profi, Sereplex, etc.)	Supplements	
14	1. Process Control Networks. 2. Determining the difference between Control & Device level Networks.	Supplements	**Lab Report 3 Due**
15	**1. TBA** **2. Review for Final**		
16	**Final Exam Per University Schedule**		

Course: EEET 418 Project Management (Required Course)

Credits:	2
Contacts:	2 Hours of Lecture
Course Description:	Learn the principles of managing senior project, including project definition, project specs, Gantt chart preparation, cost analysis, documentation and presentation. Written and oral reports are an integral part of this course.
Course Prerequisites:	Senior status in Electrical/Electronic Engineering or Computer Network and Systems
Course Outline:	The official course outline for this course can be located in the department office in room 405 in the Swan building.
Required Textbooks:	Core Concepts of Project Management, S.J. Mantel Jr., J.R. Meredith, S.M. Shafer, M.M. Sutton, 4th edition © 2011, Wiley. (ISBN 978-0-470-53301-7) Pocket Book of Technical Writing for Engineers and Scientists, 3rd, L. Finkelstein, McGraw-Hill Publishing (ISBN: 0073191591)
Course Web Site:	FerrisConnect
Required Materials:	Access to project management programs (Microsoft Project) Flash Drive for Program Storage
Faculty:	**Associate Professor Ron Mehringer**

Student Learning Outcomes

Students satisfactorily completing this course will be able to:

1. Plan a schedule for a project.
2. Allot time and resources for the project.
3. Generate a GANTT chart for the project.
4. Determine the project's status and completion date.
5. Develop strategies to solve unforeseen problems.
6. Present the results of the project in a formal presentation.
7. Generate a written report for the project.

*Program Outcomes a-k are mastered in this course.

Instructional Unit Topic Descriptions and Time Allocations

NO.	UNIT TOPIC DESCRIPTION SUMMARY	LECTURE HOURS
I.	Introduction, Grading, Project Ideas, Technical Advisor	2
II.	Description of the Project	2

III.	Developing Project Specifications	2
IV.	Schedule of Time - The Gantt Chart	2
V.	Cost Analysis	4
VI.	Construction of the Project	3
VII.	Testing the Project	2
VIII.	Documentation of the Project	4
IX.	Presenting the Project - The Demonstration	3
X.	Patents, Copyrights, and Marketing	2
X.	Exams	4
	Total Hours	30

EEET 424 Industrial Motion Control (Concentration Course)

Credits: 4 (3 + 3)
Prerequisite: EEET 313, EEET-321, MATH-226 (All C- or Better)
Instructor: Gareth Todd, Associate Professor
Lecture Text: Control Systems Technology, Johnson-Curtis & Malki-Heidar, Prentice Hall (Pearson), ISBN: 0-13-081530-6.
Reference: Programmable Motion Control Handbook, NEMA
Single Loop Control Methods, ABB Industrial Systems, Starr, Kevin D.
Design of Motion Control Systems, Tal, Jacob
EnTech Manual of Control Systems
Lab Manual: Provided via FerrisConnect (WebCT), CD and/or Handouts

Description:

The fundamentals of industrial motion control are presented. A foundation in Servo Systems and components are introduced. The Basic Control Theory with S-Plane analysis is presented. A heavy emphasis is placed on industrial applications where motion control is used in manufacturing operations. Also included is an introduction to Industrial Digital Servo Systems.

Objectives:

1. Apply physics to motion.
2. To be able to build and use motion profiles.
3. Have a working knowledge of motion control electrical and mechanical components.
4. To understand basic to advanced servo control theory and loops.
5. Sizing and specifying Servo system components.
6. To have a working knowledge of a digital servo system and simulation.
7. To have a working knowledge in programming a digital servo system.

*Program Outcomes a-h and k are mastered in this course.

Week	Lecture	Text Section	Problems
1	1. Introduction PID, Feedback, Controllers 2. Physics – Linear Motion, Rotational, Formulas	Johnson Ch. 01 Motion Cheat-sheet	JOH 1.1 – 3, 6, 8, 11 – 13 Handout/In-Class
2	1. Rotational and Linear Motion Problems 2. Linear/Rotational Problems	Handout Handout	Board Problems Group Problems
3	1. Tangential Drives, Lead-screw Drives 2. Sensors and Measurement	Handout Johnson Ch.02	Handout JO 2.1 – 6, 8, 10, 12 – 14
4 **03 Feb**	1. Sheaves and Pulleys 2. Laplace Transforms	Handout Johnson Ch. 03	Gearing Problems JO 3.1, 2, 4 – 6, 8, 9, 12, 19
5	1. Mechanical Power Transmission. 2. **Test 1**.	Handout **Chapters 1-3 + HO's**	Handout
6	1. Control Systems Strategy Open/Closed Loop 2. PID – Fundamentals, Ziegler-Nichols Tuning	Johnson Ch. 04 ABB Manual	JO 4.1,2, 4 5,7,9,10,12,16, 17

7	1. Sizing a Servo System 2. Static and Dynamic Response	Servo System Man. Johnson Ch. 05	Handout JO 5.1 – 3, 5 – 7, 9, 11
8 **03 Mar**	1. Feedback Control – First Order/Second Order 2. Critical Over/Under Dampening – PID	Johnson Ch. 05 ABB Manual	JO 5.13 – 16 In Class Problems
	Spring Break 08 Mar – 16 Mar		
9	1. Feed-Forward Control 2. Stability	Handout – EnTech Johnson Ch. 06	TBA TBA
10	1. Servo Response. **2. Test 2**	Motion Manual **Chapters 4-6 + HO's**	After spring break a new schedule will be published.
11	1. Cascade, Lambda Tuning – Direct Synthesis 2. Frequency Response Analysis	Handout – EnTech Johnson Ch. 07	TBA TBA
12 **07 Apr**	1. Lambda Tuning – Calculations 2. Root Locus	ABB Manual Johnson Ch. 08	TBA TBA
13	1. State Space Analysis 2. Digital Control Systems **Easter Break Begins 17 Apr – 20 Apr *NO CLASS***	Johnson Ch. 09 Johnson Ch. 10	TBA TBA
14	1. Steppers 2. Drives – VFD, Switched Reluctance. **Senior Projects on Friday (Required)**	Wilde (EET-313 Text) Wilde	TBA
15	**1. Test 3** **2. Discrete Control Systems**	Handout Johnson Ch. 12	TBA TBA
16 **05 May**	**Final Exam (Comprehensive) Per University Policy**		

Lab Schedule – Lab Schedule Subject to Change Due to Equipment Availability

Week	**Topic**
1	Getting Started – UltraMaster Labs 1 – 4
2	UltraMaster Labs 5 – 7 (with report due Week 3 Lab)
3	Fun with Ultra-Master – Weight and Speed Calculations
4	Feedback Labs 1 – 3
5	Feedback Labs 4 & 5
6	Feedback Labs 6 & 7
7	Feedback Labs 8 & 9 (Report – due Week 10 lab period)
8	Lab View
9	Lab View
10	Special Projex – SERCOS
11	Special Projex – SERCOS
12	Special Projex – Single Axis Servo
13	Special Projex – Robotic Work Cell
14	Special Projex – Steppers
15	Special Projex – Drives

Course :	**ETEC 140**	**Engineering Graphics Comprehensive (Required Course)**

Credits:	3 Hours
Contacts:	2 Lecture, 3 Lab Hours per Week
Course Description:	Comprehensive introductory course which integrates 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.
Course Prerequisites:	None
Course Outline:	The official course outline for this course can be located on the instructor's Ferris Connect site.
Required Textbooks:	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")
Required Materials:	• USB flash drive for CAD drawings • 45/90 triangle • 30/60 triangle • Scale or scales with 32nds, 50th/decimal inch, and metric/mm • Mechanical pencil - 0.5mm with H or HB lead • 6" center wheel compass • Eraser • Protractor • Circle template
Reference Materials:	FerrisConnect website for course
Other suggested or supplemental materials	AutoCAD student license or AutoCAD drawing format compatible 2D CAD program. Creo student license (see instructor for installation).

Faculty: **Matt Crosson – Adjunct Instructor**

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate…:

9. Understanding of the fundamental rules and guidelines used in the creation of standards compliant technical drawings.
10. Ability to read and interpret technical drawings.
11. Ability to create basic multi-view sketches of physical objects and pictorial representations that may include sectional views, auxiliary views, dimensions, and tolerances.
12. Ability to create two-dimensional CAD drawings that are compliant with drawing standards.
13. Ability to create three-dimensional computer models of parts that meet design intent and can be used for analysis in higher level classes.
14. Communicate ideas using a mix of sketches and 2-D/3-D CAD drawings.

*Program Outcomes a-c, f, g are introduced in this course.

Course: **MECH 211 Fluid Mechanics (Technical Science Elective)**

Credits/Contacts: **4 Credit Hours with 3 lecture hours and 3 lab hours per week**
Instructor: Ali Siahpush, Ph.D.

Course 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.

Pre-Requisites: PHYS 211 or PHYS 241 and MATH 126 or MATH 130 or MATH 220 or a minimum score of 26 on ACT

Textbook: **APPLIED FLUID MECHANICS *By MOTT* , EDITION:** 7TH
PUBLISHER: PEARSON,

STUDENT OUTCOMES:

1. Student will be able to function in teams to complete weekly lab assignments including reports
2. Student will be able to solve fluid flow problems using the general energy equation.
3. Student will be able to function in teams to design a fluid system involving piping and pump(s).

Program Outcomes a-g are introduced in this course.

(Tentative Course Outline)

Lecture	Topics
1	Ch-1
2	Ch-1 & Ch-2
3	Ch-3
4	Ch. 3 Manometer
5	Ch. 6 Flow of Fluids
6	Ch. 6 Conservation of mass and energy
7	Ch. 6 manometers. Bernoulli's Equation
8	Ch. 6 Bernoulli's Equation, tanks, nozzles
9	Review
10	**Exam**
11	Review of exam
12	Ch. 7
13	Ch-8 Energy losses
14	Ch 8 friction losses
15	Ch. 9 velocity profile
16	Ch. 9 reducers etc.
17	Ch-10 valves
18	Ch-9 Hydraulic system
19	Ch-10
20	Review
21	**Exam**

22	Review
23	Ch 11 Class one piping
24	Ch 11 Class II
25	Ch 11 Class III
26	Summary of Ch. 11.
27	Ch 12 Parallel piping
28	Ch-12 Parallel piping
29	Ch-13 pumps
30	Ch-13 pumps
31	Ch-13 pumps
32	Review
33	**Exam**
34	Ch. 16 Dynamics
35	Ch 16
36	Ch 16
37	Ch 7
38	Ch 17
39	
40	
	Thanksgiving
41	
	Final week (8-12 Dec 2014

Note: Instructor reserves the right to change the schedule as deemed necessary.

Course: MECH 223 Thermodynamics (Technical Science Elective)

Credits: 3 Credit Hours with 3 lecture Hours per Week

Course 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.

Course Prereqs: MATH 216/220 and PHYS 211/241

Required Textbooks: Thermodynamics and Heat Power, Rolle, 6th edition, Prentice-Hall, 2005.

INSTRUCTOR: Ali Siahpush, Ph.D.

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. Demonstrate understanding of the First Law (ABET outcome AAS 1 a, f)
2. Demonstrate understanding of fundamental processes (ABET outcome AAS 1 a, f)
3. Demonstrate understanding of fundamental cycles (ABET outcome AAS 1 a, f)
4. Function in teams to analyze a system with multiple variables (ABET outcome AAS 1, 4 a, b, d, f)
5. Write and present a study on a topic in thermodynamics (ABET outcome AAS 1, 3)

Program Outcomes a-g are introduced in this course.

Course Schedule

Topics
Review of calculus, force, energy, work
Definition of thermodynamics
Fundamental concepts of thermodynamics
No class
Chapter 3 Work, Heat, and Reversibility
Chapter 3 Work, Heat, and Reversibility
Chapter 4 Conservation of mass and 1st law of thermo
Ch. 4 Closed System
Ch. 4
Ch. 5 Open System
Ch. 5
Ch. 5 Pure Substance Properties
Review

Course: MECH 250 Fluid Power (Technical Science Elective)

Credits: 1 lecture and 2 hours lab per Week

Course Description: Lecture-lab course, which introduces the student to fluid power. Emphasis is placed on hydraulics. Included are fluid power components, elementary controls, systems, troubleshooting, and fundamental fluid science principles.

Course Prerequisites: NA

Required Textbooks: Introduction to Fluid Power, Johnson, Delmar, 2002

INSTRUCTOR: **Associate Professor Ali Siahpush, Ph.D.**

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:

1. Set up and run hydraulic and pneumatic circuits with and without elementary electrical control
2. Identify physical fluid power components and understand their function within a system
3. Create and interpret the function of fluid power schematics

Program Outcomes a-g are introduced in this course.

Course Schedule

(Tentative Course Outline)

Topics
Ch 1 & 2 Introduction & basics of hydraulics
Ch. 3 Pump
Ch. 3 Pump
Ch. 4 Cylinders
Ch. 4 Cylinders
Chapter 7 – Hydraulic pressure control
Midterm Exam
Chapter 6 part 1 – Hydraulic directional control
Chapter 6 part 2 – Hydraulic directional control
Chapter 8 – Hydraulic flow control
Chapter 9 – Ancillary hydraulic components
Chapter 12 – Pneumatic components
Chapter 13 – Electronic control of fluid power
Exam Review
Cumulative Final Exam

Note: Instructor reserves the right to change the schedule as deemed necessary.

Course: MECH 340 _ Statics and Strength of Materials

Credits: 4 Hours

Contacts: 4 Lecture, 0 Lab Hours per Week

Course Description: Statics and Strength of Materials is a part of physics known as mechanics. This course looks at forces, components, resultants, equilibrium, friction, centroids, and moments of inertia. It covers strength of materials topics of stress/strain, deformation, material properties, factor of safety, torsional stress/deformation, beam stresses/deformation, and combined stress.

Course Prerequisites: MATH 126, PHYS 211

Required Textbooks: None.
Suggested: any edition of any Statics and Strength of Materials text.

Required Materials: Scientific calculator

Faculty: Professor Randy J. Stein

Student Learning Outcomes

Students satisfactorily completing this course will achieve/complete/demonstrate:
1. Solve concurrent force systems for unknowns.
2. Solve non-concurrent force systems for unknowns.
3. Construct shear and bending moment diagrams for beams.
4. Determine stresses associated with axial, bending, shear, torsional, and combined loadings.

Program Outcomes a-g are reinforced in this course.

Course Schedule

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Date	Lecture Topic	Assignment	Comment
ek 1	Introduction; units; math	omework; in-class	-class examples; industry examples
k 2-3	Concurrent force systems	omework; in-class	Individual assignments
k 4-5	Axial stress	omework; in-class	Individual assignments

	Exam		Written exam
ek 6-8	Non-concurrent force system; moments; centroids	omework; in-class	Individual assignments
k 9-11	Equilibrium of Rigid Bodies; trusses; dist. loads	omework; in-class	Individual assignments
	Exam		Written exam
ek 12	n; shear stress; moment of inertia	omework; in-class	Individual assignments
k 13-14	Bending stress; shear and moment diagrams	omework; in-class	Individual assignments
ek 15	Beam deflections; Combined loading	omework; in-class	Individual assignments
ek 16		Final exam	Written exam

COURSE: MFGE 341

COURSE TITLE: Quality Science Statistics

COURSE DESCRIPTION: This course is a detailed study of the applications and fundamentals of data analysis covering distributions, linear relationships, cause-effect, collection of data, probability, counts, proportions, sample means and inferences.

CREDIT HOURS: Three Semester hours

CONTACT HOURS: Lecture: 45 hours total
Laboratory; none

PREREQUISITE: College level algebra (Math 116 or equivalent) junior standing or permission of instructor.

Text: Elementary Statistics, 3rd ed., Larson and Farber
PLEASE NOTE: THIS TEXT IS ALSO REQUIRED FOR MFGE 342 AND 442.

UNITS OF INSTRUCTION AND STUDENT LEARNING GOALS FOR EACH UNIT:

At the completion of each unit the student will:

I. Introduction
   a. Know the purpose of the course and its relationship to other courses in the program
   b. Know what the course objectives are and how they will be measured for completion
   c. Understand the grading scale

II. Statistics Defined
   a. Understand the difference between the fields of mathematics and statistics
   b. Understand what constitutes a Random Variable and what does not.

III. Describing Data
   a. Population vs. Sample
   b. Data Collection
   c. Plot The data
   d. Measures of Central Tendency

IV. Counting and Probability Principles
   a. Be able to employ simple counting rules regarding the number of ways outcomes can occur relative to finite populations of discrete things.
   b. Know simple rules of probability that apply to occurrences (events) of random variables that fall into the classes of:
   c. Be able to construct probability statements that reflect the probability value associated with various elements of a random variable.
   d. Have a working knowledge of Chebychev's Theorem

V. Discrete Probability Distributions
   a. General Probability Distributions
   b. The Binomial Distribution

c. The Poisson Distribution

VI. Continuous Random Variables
   a. Know the difference between Continuous and Discrete Random Variables
   b. Know what constitutes a Normally Distributed Random Variable.
   c. Be able to Estimate the Mean and Variance of a Normally Distributed Random Variable
   d. Be able to transform any Normal Distribution into a Standard Normal Distribution.
   e. Be able to determine Probabilities associated with ranges of values associated with Normally Distributed Random Variables.
   f. Be able to determine the value of a normally distributed random variable that is associated with a prescribed area under a normal curve.
   g. Be able to sketch Normal Distributions with area under the curve shaded that corresponds to the probability values sought.
   h. Approximation

VII. Types of Errors
   a. Know the types of errors associated with decision making

VIII. Sample Means
   a. Understand and be able to apply the Central Limit Theorem for predicting outcomes of Sample Means.
   b. Be able to calculate Confidence Intervals for sample means
   c. Be able to calculate the minimum sample size required to achieve a desired level of Alpha Risk.

IX. Sample Proportions
   a. Be able to calculate Confidence Intervals for sample proportions

X. Hypothesis Testing
   a. Given the description of a Population, be able to construct Statistical Hypothesis statements regarding the values of parameters for the population.
   b. Be able to conduct the following Hypothesis tests at stated alpha risks:
   c. Know what a P-Value is as it relates to decision making risk.

XI. Two Variable Regression and Correlation
   a. Be able to construct a Scatter Plot and explore relationships between 2 variables
   b. Be able to propose a straight line equation in the form of $y=mX + b$, using least squares regression.
   c. After overlaying the calculated line on the associated scatter plot, be able to evaluate the fit of the line to the data.
   d. Know what a residual is with regard to linear regression.
   e. Be able to calculate the correlation coefficient
   f. Understand the difference between Correlation and Causation

Program Outcomes a-g are reinforced in this course.

Course Title: MFGE 342 – Statistical Quality Control

Course Description: This is a basic course that covers the fundamentals and use of statistics as they apply to controlling manufacturing quality in industry. Also covered will be the

construction and interpretation of various charts and graphs including histograms, Pareto charts, and both attribute and variable control charts. The application of these tools will be emphasized.

Credit Hours: 3 semester credits

Contact Hours: Lecture: 3 hrs/week
Lab: none

Prerequisites: MFGE 341

Textbook Required: Statistical Process Control Methods for Long & Short Runs, Griffith, ASQ, ISBN 0 87389 345 X

Elementary Statistics, Third Edition, Larson and Farber

Units of instruction and student learning goals for each unit:

A. Introduction
   1. Know the course goals, attendance requirements and grading policy.
   2. Know the significant events in the history of quality control.

B. Review of the fundamentals of statistics critical to statistical process control.
   1. Know what constitutes a random variable.
   2. Understand basic rules of probability that are particularly useful in SQC work.
   3. Understand basic counting rules that are particularly useful in SQC work.
   4. Understand the relationship between distributional parameters and estimators of those parameters.

C. Process control and improvement
   1. Understand the underlying principles of Shewhart type control charts used in the improvement of process quality.
   2. Be able to construct a varEEITy of variables control charts for the purpose of monitoring process improvement efforts.
   3. Given an industrial shop floor scenario, be able to select the most appropriate variables control chart.
   4. Be able to construct a varEEITy of attribute control charts and know their underlying distributional assumptions.
   5. Be given an industrial shop floor scenario, be able to select the most appropriate attribute control chart from the following list:

      p chart np chart
      u chart c chart

   6. Be able to calculate and plot control limits for the various control charts given a sample data set.
   7. Be able to explain the differences between control limits and blueprint specifications.
   8. Given a non-random pattern of plot points, be able to calculate the probability of that pattern occurring on a control chart without anything changing in the process.

9. Understand what is meant by the term “out of control” with regard to process trends on a control chart.

D. Process Capability Indexes
   1. Given a data set and product drawing requirements, be able to calculate commonly used capability indices in industry. These include: Zmax, Zmin, Cp, Pp, Cpk, and Ppk
   2. Given a capability index, be able to interpret its meaning with regard to a manufacturing process.

E. Measurement System Analysis
   1. Know the terms associated with measurement error in measuring systems used in industry.
   2. Given a measuring system, be able evaluate Gage Repeatability and Reproducibility Gage R&R)
   3. Be able to determine the suitability of a gage given a particular product drawing requirement.

F. Process Control Plans
   1. Understand what a control plan is and its importance to a manufacturing process.
   2. Know the relationship between Process Failure Mode and Effects Analysis (PFMEA) and control plans.
   3. Be able to construct rudimentary control plans for simple manufacturing processes.

G. Acceptance Sampling
   1. Know the symbols, terms and definitions associated with acceptance sampling.
   2. Be able to construct on OC Curve for single sampling plans.
   3. Know when a lot should be rejected based on accept/reject criteria.

Program Outcomes a-g are reinforced in this course.

Course Title: MFGE 353 - Statistical Quality Control

Course Description: This is a basic course that covers the fundamentals and use of statistics as they apply to controlling manufacturing quality in industry. Also covered will be the construction and interpretation of attribute and variable control charts. Other statistical methods including simple linear regression, measurement systems analysis, simple 2 level factorial experimental designs, and cause and effect diagrams will be covered as well.

Credit Hours 3 semester credits

Contact Hours: Lecture: 3 hours/week
Lab: none

Prerequisites: Math 115 or MATH 116 or a minimum score of 24 on ACT or 560 on SAT

Textbook Required: Quality Control, 8th Ed., Besterfield

Units of Instruction and Student Learning Goals for Each Unit:
Upon successful completion of the course (defined as receiving a "C" grade or better) the student will:

A. Introduction
    1. Know the course goals, attendance requirements and grading policies.
    2. Know the significant events in this history of quality control.

B. Fundamentals of Statistics Critical to SQC
    1. Know what constitutes a random variable.
    2. Understand basic rules of probability that are particularly useful in SQC work.
    3. Understand basic counting rules that are particularly useful in SQC work.
    4. Given a data set, be able to calculate common sample statistics, median, mode, arithmetic mean, range, standard deviation and variance.
    5. Understand the relationship between distributional parameters and estimators of those parameters.
    6. Know the parameters of the normal distribution.
    7. Be able to estimate the mean and variance of a normally distributed random variable.
    8. Be able to standardize a normally distributed random variable so the standard normal tables can be used to determine probabilities about values of that random variable.
    9. Be able to utilize the Central Limit Theorem to state probabilities about average values given estimates of the mean and variance of a population.
    10. Given the probability of occurrence of a random variable, be able to write an appropriate probability statement and state the correct probability.

C. Plotting Data

1. Given a data set, be able to create a simple tally, histogram, stem & leaf plot, box and whisker plot, time graph, Pareto chart, and be able to interpret them.

D. Process Control and Improvement
    1. Understand the underlying principles of Shewhart type control charts used in the improvement of process quality.
    2. Be able to construct a varEEITy of variables and attribute type control charts for the purpose of monitoring processes.
    3. Given an industrial shop floor scenario involving a typical quality situation, be able to select the most appropriate attribute or variables control chart from the following list.
        Xbar & R
        X & Rm
        P chart
        NP chart
        C chart
        U chart
    4. Given a non-random pattern of plot points, be able to calculate the probability of that pattern occurring on a control chart without anything changing in the processs.
    1. Understand what is meant by the term "out of control" with regard to process trends on a control chart.

E. Process Capability Indices
    1. Given a data set and product drawing requirements, be able to calculate commonly used capability indices in industry without the aid of a formula sheet.
    2. Given a capability index, be able to interpret its meaning with regard to a manufacturing process.
    3. Understand the difference between process capability and process performance with regard to capability indices for typical manufacturing processes.

F. Measurement Systems Analysis
    1. Know the terms associated with measurement error in measuring systems used in industry.
    2. Given a measuring system, be able to use the "short" method for evaluating Gage Repeatability and Reproduceability (Gage R&R).
    3. Be able to determine the suitability of a gage given a particular product drawing requirement.

G. Regression Analysis
    1. Be able to construct a scatter plot to aid in determining if a meaningful relationship exists between a dependent and independent variable.
    2. Be made aware of the derivation of the least squares method used in linear regression.
    3. Be aware of the restrictions and assumptions underlying least squares regression.

Program Outcomes a-g are reinforced in this course.

COURSE TITLE: **MFGE 423 ENGINEERING ECONOMICS**

COURSE DESCRIPTION: The **Engineering Economics (MFGE423)** course is designed to advance the students knowledge in the subject of engineering economic analysis. Understanding and applying engineering economic principles for financial analysis and management of people, projects, business processes and organizational units. Also, money and time relationships in respect to capital purchases and equipment justification are discussed in detail.

CREDIT HOURS: Two semester hours

CONTACT HOURS: Lecture - 2 hrs/week (Tuesday evenings 6pm – 7:50pm starting 8/31/2010)

PREREQUISITES: Math 126 or equivalent

INSTRUCTOR: John F. Mola – Interiors Engineering Manager – Visteon Corporation
EMAIL: johnfmola@yahoo.com (*preferred contact method*)
molaj@ferris.edu (*secondary contact method*)
PHONE: 586.242.8747

OFFICE HOURS: BY APPOINTMENT & 30 minutes before each class

REQUIRED TEXT & MATERIALS: Fundamentals of Engineering Economics
Author: Chan S. Parks, Publisher: Prentice Hall
ISBN: 0-13-030791-2

COURSE GOALS & OBJECTIVES:

I. Introduction
   A. Know the course goals, attendance requirement and grading policies
   B. Know significant events in history of engineering economy
   C. Know the major importance of engineering economy to manufacturing

II. Time Value of Money
   A. Know time value of money concept
   B. Know the difference between simple and compound interest
   C. Know the difference between nominal, effective and continuous compounded Interest rates
   D. Given a nominal interest rate, be able to calculate the annual effective rate or effective rate over a specified period of time

III. Discounted Cash Flow Calculations
   A. Be able to construct cash flow diagrams
   B. Be able to calculate time-value equivalent amounts given various forms of cash flow
   C. Be able to do calculations with continuous interest

IV. Discounted Cash Flow Comparisons
   A. Be able to do Present-Worth comparisons
   B. Be able to do Equivalent Annual-Worth comparisons
   C. Be able to do Rate-Of-Return comparisons

V. Economic Analysis
   A. Know how to identify and classify alternatives
   B. Be able to do incremental rate of return analysis of mutually exclusive alternatives
   C. Be able to analyze independent alternatives
   D. Be able to do lease vs. buy analysis

VI. Management of Money
   A. Be aware of depreciation
   B. Be aware of inflation
   C. Know the basis companies use for establishing their minimum acceptable rate of return (MARR).

Program Outcomes a-g are reinforced in this course.

COURSE TITLE: PDET 413 Applied Fluids and Thermodynamics

COURSE DESCRIPTION: This course is designed to provide the Product Designer with an understanding of applied Fluid Mechanics and Thermodynamics adequate to analyze, design and/or modify a wide range of products. The course begins with the development of critical fluid flow terms and concepts common to both Fluid and Thermodynamics problems. This is followed by the Thermodynamic portion of the course in which the concept of energy conversion is extended into the development and applications of the first law. The second and third laws are then presented and developed into an understanding of thermal efficiency. Heat Transfer Thermodynamics is a significant area of concentration. The Fluid Dynamics portion of the course covers basic fluid science concepts and develops the background necessary to design/understand basic hydraulic systems.

CREDIT HOURS:	Three Semester Hours
CONTACT HOURS:	Lecture - 3 hours/week
	Lab - 0 hours/week
PREREQUISITES:	MATH 116, PHYS 211 or equivalent
TEXTBOOK REQUIRED:	Thermodynamics and Heat Power
	Any Edition; Rolle; Merrill
TEXTBOOK RECOMMENDED:	Fluid Power with Applications
	Any Edition; Esposito, Prentice Hall

COURSE OUTCOMES:

1. Understand terminology relevant to Thermodynamics and Fluid Power
2. Apply work, energy and power concepts to closed system operation
3. Apply work, energy and power concepts to open system operation
4. Apply Heat Transfer concepts to analyze energy transfer in various media
5. Apply fluid power concepts to analyze hydraulic systems

Program Outcomes a-g are reinforced in this course.
The Student Will -

I. Introduction
   - A. Know the course goals, attendance policy and grading policy.
   - B. Understand the history of Thermodynamics. Review fundamental concepts of temp, pressure and EGS vs SI systems of measure.

II. Thermodynamic & Fluid Systems
   - A. Understand System, Boundary, properties and System States and how they relate to Processes and Cycles.
   - B. Know the meaning and be able to determine properties such as specific volume, density, specific weight, specific gravity, gage pressure vs. absolute pressure and correct symbology and units.
   - C. Review Energy and the concept of Internal Energy.

III. Energy Transfer in Fluid Systems
   - A. Understand the definition, units, types and determination of Work.
   - B. Understand the definition, units and determination of Power.

C. Understand the definition, units, types and determination of Heat.
D. Know the concept of Reversibility.
E. Categorize Open, Closed and Isolated Systems.

IV. Conservation of Mass in Fluid Systems
A. Know how to differentiate and determine Mass and Volumetric Flow in Fluid Systems.
B. Use the concepts of Steady flow and Uniform flow to solve fluid system problems.

V. Conservation of Energy and the First Law of Thermo.
A. Know the basis and development of the First Law for the Law of Conservation of Energy including Enthalpy.
B. Apply the First Law to Closed Thermodynamic Systems.
C. Apply the First Law to Open Thermodynamic Systems.
D. Understand the significance of Adiabatic Processes.

VI. Properties of Liquids, Gasses and Ideal Gasses
A. Understand phase changes.
B. Know and apply the ideal gas relationship.
C. Know and apply the Caloric Equations of State.

VII. Heat Engines, Second & Third Law of Thermodynamics
A. Identify and define the characteristics of Isobaric, Isometric, and Isothermal Ideal Gas Processes.
B. Analyze the Carnot Cycle to determine work and efficiency of a heat engine.
C. Define Entropy and the Second Law of Thermodynamics.
D. Understand the Third Law of Thermodynamics.

VIII. Heat Transfer
A. Understand the three modes of heat transfer.
B. Be able to evaluate heat transfer via conduction
C. Be able to evaluate heat transfer via convection.
D. Be able to evaluate heat transfer via radiation.

IX. Energy and Power in Hydraulic Systems
A. Understand viscosity and noncompressible fluids.
B. Apply the conservation of energy to hydraulic systems.
C. Understand the basis and application of Bernoulli's Equation.
D. Understand the determination of hydraulic power.

X. Hydraulic Components and System Design
A. Be able to identify and understand the operations and characteristics of common pumps, actuators and valves.
B. Be able to describe simple hydraulic circuits schematically.
C. Be able to analyze and design simple hydraulic systems.

MINIMUM STUDENT LAB ACTIVITIES: None

COMM 121 Fundamentals of Public Speaking (Communications Competence Requirement)

Instructor: Dr. Donna Smith

Required text: *Building a Speech*, (8th ed.) by Sheldon Metcalfe (Thomson/Wadsworth)

Credits/Contacts: 3 Credits with 3 lecture hours per week

Course Description: Training and experience in preparation and delivery of short speeches with emphasis on the clear, concise, logical communication of ideas. Emphasis will be placed on informative and persuasive speaking.

General Education Objectives met by this course: This course fulfills the Speech Communication Outcomes Criteria and Writing Outcomes General Education degree Requirements. These entail:

-Speech Communication outcomes: Successful students will be able to:

-Identify and describe the components of human communication process
-Identify and describe the literal message content and the relationship variables between communicators in interpersonal, small group and presentational contexts
-Select, present, interpret and respond appropriately and effectively to verbal and nonverbal messages in interpersonal, small group or presentational contexts
-Use verbal and nonverbal messages to achieve personal, interpersonal, small group or presentational goals, while developing and maintaining relationships with others
(Obviously, our primary focus will be on presentational goals).

-Writing outcomes: Successful students will demonstrate knowledge of/produce:

-Awareness and knowledge of audience
-Purpose for writing
-Problem solving and researching
-Organizing
-Editing
-Collaborating

Specific Course objectives: By the end of the course, the successful student should be able to demonstrate/gain:

-Mastery of university-level library research techniques and a familiarity with primary, secondary and tertiary research materials.
-Ability to organize speech concept and ideas in a manner which best suits target audience needs.
-Effective critical listening and analytic skills, allowing deconstruction and rigorous examination of arguments through knowledge of argumentation theory.
-The ability to construct cogent arguments logically and maximize their validity.
-A vigorous awareness of current events and social issues.
-Highly developed skills of presentation across a broad range of contexts and situational requirements.
-A basic knowledge and awareness of rhetorical history and theory and a sophisticated sense of rhetorical criticism.

Overall, this course focuses not simply on speech performance, but writing skills, critical thinking skills, research skills and awareness of current events.

Course Schedule
NOTE: Syllabus lists chapters of book to skim weekly
Week 1 – 8/25 Chapters 1, 2, 3, 4, 13 Communication Model; Speeches of anger preparation
Week 2 – 9/1 Speeches of Anger (begin Tuesday, September 2, 2014)
Chapters 5, 6, 7, 11, 15
Week 3 – 9/8 General information on demo speech preparation and on group speech
Week 4 – 9/15 Presentation of Speech to Inform thru Demonstration (Begins Sept.9)
Week 5 – 9/22 Demo speech continued; Chapters 8, 9. 10
Week 6 – 9/29 Demo speech continued if needed; Group speech preparation
Week 7 - 10/6 Group Speech preso (begins Tuesday, Oct. 7); Chapters 12, 14, 16, 17
Week 8 -10/13 Group Speech presentation continued; Chapters 18, 19

Week 9 – 10/20 Group Speech presentation continued if necessary
Persuasion speech preparation
Week 10 – 10/27 Persuasion speech preparation
Impromptu 1 (If there is time)
Week 11- 11/3 Impromptu begins Tuesday, November 4
Week 12 – 11/10 Presentation of Speech to Persuade begins Tuesday, Nov. 11
Week 13- 11/17 Presentation of Speech to Persuade
Week 14- 11/24 Presentation of Speech to Persuade and Impromptu 2 if time
No class Thursday, Nov. 27 Thanksgiving recess)
Week 15 – 12/1 Speech of Special Occasion outline due Thursday, Dec. 4
Review for final
Speech dates are subject to change as determined by instructor.

Week 16 – 12/8 Exam week: Final is Monday, Dec.8, at 2:00 - 3:40 PM in Johnson 104 (Please arrive at 2 PM and no later; exam begins at 2:00 and no later)

ENGL 150 English 1 (English Composition)

Instructor: Lynn Chrenka, Ph.D.

Course Description:
ENGL 150 (3 credit hours) is a freshman writing course in which students organize and develop papers for diverse audiences and purposes, including how to discover and focus on a topic, develop ideas, provide support, and draft and revise papers effectively. This course is also expected to cover fundamental language skills and provide an introduction to library research and argumentation. A grade of C- in this course is a prerequisite for ENGL 250.

Prereqs: ENGL 074 or ACT English 14

Credits/Contacts: This course is 3 credits and 3 hours per week for contacts

Outcomes:
Upon successful completion of ENGL 150, students will demonstrate competence in the following areas: They will analyze the context and define the purpose of a writing situation and then develop ideas to "solve" it, adjusting writing to effectively achieve their purposes. They will be able to make claims and state and support assertions, organize their ideas effectively for their audiences, maintain connections among key points, and choose words and a tone appropriate to particular audiences, distinguishing between writer-centered and reader-centered prose.

In addition, they will be able to locate reliable resources for their writing and assess and evaluate the information they find. They will experience critiquing others' drafts and working collaboratively on writing situations to improve ideas and approaches. Finally, they will improve content and style using feedback and revision as well as editing their documents for consistent point of view and voice, standard grammar, syntax, punctuation, and spelling.

ENGL 150 also satisfies in part Ferris State University's general education outcomes for communication competence: awareness and knowledge of audience, purpose for writing, problem solving and researching, organizing, editing, collaborating, and producing written products.

The primary goal of this course is to help students improve their writing skills with an emphasis on the kinds of writing and thinking students are likely to be asked to do in the academic setting. Students will write and revise a number of papers, formulate their own purposes and structures for their writing, and share their writing both in small "workshop" groups of classmates and with the class as a whole to practice the reading/writing techniques associated with university work. In addition, the following question will guide our explorations together in this section of ENGL 150: **What is "general education" at Ferris State University, what is the function of general education courses and outcomes in a college education, and what is their "worth" beyond college?** Together we will formulate some answers to this question and reflect on its importance in writing and discussion.

*Program Outcome g is introduced in this course.

Required Texts and Other Resources:
Access to the **Purdue University Online Writing Lab** http://owl.english.purdue.edu/owl/

Course Notebook or Folder (bring to every class meeting)
Writing Supplies (paper, pen, flash drive, for example)

Major Writing Assignments:

1. Letter to Lynn (20 points)
2. Supporting Claims You Make: Categorical Proposition (20 points)
3. Exploring Your Writing Process: Essay (30 points)
4. Taking a Position: Blog (Web Log) (40 points)
5. Taking a Position: Op-ed (60 points)
6. Essay: Who Are You Other than Your Career? (80 points)
7. Inquiry: What's the "Worth" of a College Education? (100 points)

ALL of these assignments must be completed to pass the course.

Other sources of points--drafts, exercises, and other tasks leading up to the major assignments listed above--will also count in the total number of points for the course. (See percentages necessary for particular grades below.)

Course Title: English 250

Credits: Three Semester Credits

Prerequisites: English 150 with a C- or better

Instructor: Mr. Burneister

Textbooks: **Roen, Duane, Gregory R. Glau,and Barry Maid. The McGraw-Hill** Guide: Writing for College, Writing for Life. Boston:McGraw-Hill, 2nd ed. 2010. plus Handbook

Smith, R. Kent. Building Vocabulary for College: Ferris State University Edition. Boston:Wadsworth,2012.

Oreskes, Naomi and Erik Conway The Collapse of Western Civilization. New York:Columbia University Press, 2014.

COURSE DESCRIPTION AND OBJECTIVES:
This is the second of a two-course sequence. This course focuses on writing from sources. Students will learn how to use sources (library, Internet, other) to produce documented papers, to evaluate conflicting claims and evidence, and to write an extended argument. The course will stress inquiry, problem solving, and reasoning skills, but it will also teach grammatical structure, diction, and style appropriate to academic and professional writing situations.

COURSE REQUIREMENTS

1. Major written projects – There will be four major papers covering assigned topics. (45% of final grade)
2. Tests - Three tests on assign book and textbook chapters. (15% of final grade)
3. Power point – The power point is done after the analysis paper. (5 % of final grade)
4. Vocabulary Exercises – These are done as homework. (10% of final grade)
5. Peer Reviews - These are done in class on day rough drafts are due. (10% of final grade)
6. Final Exam – There will be an open book final exam. (5 % of the final grade)

*Program Outcome g is reinforced in this course.

ENGL 311: ADVANCED TECHNICAL WRITING

- "Course Materials for Advanced Technical Writing" (course packet)

INSTRUCTOR: Dr. Andrew Kantar

Credits/Contacts: This is a 3 credit course meeting three times per week

COURSE DESCRIPTION

English 311 is an advanced writing course designed to give juniors and seniors in technology an opportunity to write exclusively in their fields. **The writing requires specialized technical knowledge and is, therefore, most beneficial for students who have taken a significant number of credits in their core curriculum**. Unlike ENGL 211, a sophomore-level course that typically requires shorter reports, ENGL 311 involves *a sophisticated multi-part project that includes industry-based research and analysis of technical data for specific audiences*. (Prerequisites: ENGL 250 or 211 and junior/senior status)

OUTCOME ASSESSMENT FOR ENGL 311

STUDENT LEARNING OUTCOMES	EVALUATION OF STUDENT ACHIEVEMENT
Students will demonstrate the ability to compose an extended written project for a specific audience in the workplace.	udents may write an extended document that helps a problem in the workplace.
Students will demonstrate the ability to integrate visuals into text.	Students may integrate visuals into their written projects.
Students will demonstrate the ability to use information design strategies to help design their professional documents.	udents may design their documents by applying the information design principles.
Students will demonstrate the ability to write a varEEITy of support documents intended for different audiences.	4. Students may write short support papers such as memos, proposals, progress reports.
Students will demonstrate the ability to write effectively by using Standard English.	udents may write memos, proposals, progress reports, and
6. Students will, where appropriate, work collaboratively to produce professional documents.	mplete editing and proofreading exercises.
7. Students will demonstrate ability to apply ethical principles in responding to professional communication situations.	tudents may work in small groups to work on a professional
8. Students will, where appropriate, present information orally.	oject.
	udents may write memos, proposals, progress reports, and
	xpended projects to apply ethical principles.
	tudents may orally present their projects to their peers.

*Program Outcome g is reinforced in this course.

COURSE OUTLINE

Week 1 1/13 Course introduction.
1/15 Discuss Dynatronix memo and discuss Technical Description Memo.

Week 2	1/20	Critique student technical descriptions.
	1/22	*Presenters' day for technical description.*
Week 3	1/27	Introduce Feasibility Report and Proposal.
		Technical Description due.
	1/29	Critique sample feasibility proposals.
Week 4	2/3	Optional conferencing on feasibility topics.
	2/5	Optional conferencing on feasibility criteria.
Week 5	2/10	*Presenters' day for feasibility proposals.*
	2/12	Begin discussion of feasibility report annexes (body).
		Feasibility Report Proposals are due.
Week 6	2/17	Sample feasibility annexes.
		Evaluated Feasibility Proposals returned.
	2/19	Optional: Résumé/Job Letters.
Week 7	2/24-26	Optional individual conferences on Annexes (in my office, ASC 1017-F)
Week 8	3/3	Work on Annexes outside of class.
	3/5	Work on Annexes outside of class.
	3/10 & 3/12	NO CLASS: SPRING RECESS
Week 9	3/17	Discuss Feasibility Report Introductions.
	3/19	Discuss Factual Summaries, Conclusions, and Recommendations.
Week 10	3/24	*Presenters' day for Feasibility Annexes.*
	3/26	**No Class: Business and Technology Career Fair (Wink Arena)**
Week 11	3/31	Introduction to Oral Presentations.
		Feasibility Report Annexes are due.
	4/2	NO CLASS: MID-SEMESTER RECESS
Week 12	4/7	*Presenters' day for Other Parts: Feasibility Intros, Factual Summary, Conclusions, and Recommendation*
	4/9	In-class preparation for small-group oral/written presentation.
		Feasibility Report Introductions, Factual Summaries, Conclusions, and Recommendation are due.
Week 13	4/14	Continue preparation of presentations and brochures.
	4/16	**Oral Presentations**.
		Due: Product marketing brochures for groups presenting this day
Week 14	4/21	**Oral Presentations**.
		Due: Product marketing brochures for groups presenting this day.
	4/23	Introduce Ethics Assignment: Case Study "Rail-Car Rhetoric." Discuss false inference, writer/reader obligation, decision-making process.
Week 15	4/28	Small-group work on Ethics Project.
	4/30	**Ethics Memos are due.**

Appendix B – Faculty Vitae

Steve Johnson

Experience

2014-present **Ferris State University** **Big Rapids, MI**

Assistant Professor, Computer Networks and Systems Department

Teach Networks 1, 2, 3, 4; Network Theory & Test; Network Security; C/C++ programming; and Realtime Operating Systems courses. Develop lecture and lab material to emphasize key concepts, develop labs, quizzes and exams for student assessments.

2012-2014 **Ferris State University** **Big Rapids, MI**

Adjunct Professor, Computer Networks and Systems Department

Teach C/C++ programming and Realtime Operating Systems courses.
Taught Theory of Electricity through Ferris State University Corporate & Professional Development and Technology/Energy summer camps.

2005-2014

Ferris State University **Big Rapids, MI**

Equipment Repair Technician, Electronics & Surveying Department

Repair/calibrate laboratory equipment in the electronics department. Equipment includes power supplies, function generators, oscilloscopes, DMMs, VOMs, decade boxes, relay trainers, and motor trainers. Troubleshoot hardware and software issues relating to data acquisition units and PLCs. Troubleshoot PLC network configurations of Ethernet, Controlnet , and Devicenet. Assist faculty and students with equipment usage, part specifications, and project feasibilities. Purchase and maintain a parts inventory as well as recommend the purchase of new equipment.
Assist with surveying equipment issues; aid in repairs of Leica Geosystems and Trimble consigned equipment. Work with MDOT on the Continuous Operating Reference Station (CORS) and Trimble's counterpart.

2003-2005

Ferris State University **Big Rapids, MI**

Network Infrastructure Team, Wireless Infrastructure Team

Maintain the reliability of the Ferris State University campus network through an on-call weekend rotational status. Repair downed networks and network services.
Install, setup, and configure network equipment including switches, routers, passport systems (layer 3 switch), and other network equipment.
Wire patch panels, pull network cable, and verify network connections.
Develop, install, configure, and document the Ferris State University's wireless network.

1986-2005

Ferris State University **Big Rapids, MI**

Instrument Repair Technician, Telecommunications

Facilitate repairs of the laboratory equipment for the following colleges/departments: Dental, Clinical Lab Science, Nuclear Medicine, Nursing, Pharmacy, Optometry, Biology, Chemistry, and Physics. Includes maintenance and repair of dental chairs, ultrasonic cleaners, hand pieces, incubators, scales, vacuum pumps, gamma cameras, X-ray machines, nuclear magnetic resonance (NMR's), infrared and flame

spectrophotometers, power supplies, resistance boxes, computer controlled experimentation and simulation, lensometers, and slit lamps.
Repair computer equipment throughout campus including CPU's, monitors, printers, scanners, and laptops. Also networking equipment including concentrators, hubs, network interface cards, and uninterrupted power supplies.
Maintain Microsoft Windows NT 4.0 servers for dial-in access, website publishing, and FTP file sharing. Produced the Instrument Repair website.

EDUCATION

2010-2014 **Ferris State University** **Big Rapids, MI**

Bachelor of Science Degree in Computer Networks and Systems
Courses include Networks 1, 2, 3, 4 (Cisco Routing and Switching); Real-time Operating systems; Network Theory and Test; Network Security Theory – Technology.

2007-2010 **Ferris State University** **Big Rapids, MI**
Bachelor of Science Degree in Electrical/Electronics Engineering Technology
Courses include Advanced Digital Systems, Advanced Digital Design, Network Analysis, Industrial Communication, Industrial Motion Control, Project Management, and Senior Projects.

1993-2007 **Ferris State University** **Big Rapids, MI**
Completed coursework toward Associate Degree in Pre-Engineering
Courses complete include Linear Algebra; Calculus 1, 2, 3, 4; Differential Equations; Calculus-based Physics 1, 2, 3; Statics; and Dynamics.

1987-1993 **Ferris State University** **Big Rapids, MI**
Minor in Computer Science
Courses include Basic, Pascal, FORTRAN, Assembly Language, C++, Borland C++ OWL (Windows programming), Borland C++ DBE (SQL), Data Structures, Computer Simulation, Computer Graphics, and Numerical Methods.

1983-1986 **Ferris State University** **Big Rapids, MI**
Associate Degree in Industrial Electronics
Courses included DC circuits, AC Circuits, Digital Circuits, Microprocessors, A-D/D-A Converters, Transducers, Relay Logic, and Programmable Controllers.

Certifications and other Training

Sept 2013 Cisco Cisco Systems.
Cisco CCNA Instructor Fast Track training
Cisco's validation to instruct the CCNA Routing and Switching courses.

June 2013-2016 Cisco Cisco Systems, Inc.
Cisco Certified Network Associate Routing and Switching
Cisco's certification for entry-level network engineers validating the ability to install, configure, operate, and troubleshoot medium-size routed and switched networks.

Achievements & Memberships	Ferris State University Distinguished Staff Award, 2009. Article published in Circuit Cellar, January 2012, **The SMD Air Bath** A DIY PCB Preheating Setup. Institute of Electrical and Electronics Engineers member.

1) **Name:** Warren Klope

2) **Education**
Master of Science, Systems & Industrial Engineering, Oakland University, 04/1987.
Bachelor of Science, Engineering, Concentration: Systems, Oakland University, 06/1977.

3) **Academic Experience**
Ferris State University, Professor, Faculty, Electrical/Electronics Engineering Technology & Computer Networks and Systems, (08/2003-present), full time.

Ferris State University, Assoc. Professor, Faculty, Electrical/Electronics Engineering Technology & Computer Networks and Systems, (08/2001-08/2003), full time.

Ferris State University, Assoc. Professor, Department Chair and Associate Professor – Electrical/Electronics Engineering Technology & Computer Networks and Systems, (03/2000-08/2001), full time.

Ferris State University, Assoc. Professor, Program Coordinator, Electrical/Electronics Engineering Tech. & Computer Networks & Systems, (01/2000-02/2000), full time.

Ferris State University, Assoc. Professor, faculty, Electrical/Electronics Engineering Technology & Computer Networks and Systems, (08/1995-01/2000), full time.

Ferris State University, Assist. Professor, faculty, Electrical/Electronics Engineering Technology & Computer Networks and Systems, (08/1987-08/1995), full time.

4) **Non-academic experience**
U.S. Army Tank & Automotive Command, Mechanical Engineer/Project Engineer – Concepts Laboratory (03/1984-09/1985), full time.

U.S. Army Tank & Automotive Command, Mechanical Engineer / Programmer, Computer Management and Applied Research Office, (06/1981-03/1984), full time.

Chrysler Defense Corporation, Computer Programmer, (07/1980-10/1980), full time.

Chrysler Corporation, Engineer, Test & Development II – Digital System Applications, (08/1979-04/1980), full time.
Chrysler Corporation, Engineer in Training – Chrysler Institute of Engineering (one of 13 selected from across the nation for the entering class) (08/1977-08/1979)

5) **Certifications or professional registrations**
Certified Instructor for Level 1 in the Siemens Mechatronics Systems Certification program via Siemens Technic Akademie (20120727)

6) **Honors and Awards**

Ferris State University, Division of Academic Affairs, Award for Outstanding On-Line Course Web-Enhanced. (04/20/2006)

Ferris State University, FerrisCONNECT Implementation Project Support Team, (2006-2008)

7) **Service activities**
Serving on the: University FCTL Advisory Board, University E-learning Management Advisory Team, College Promotion Committee, Program Committees: Curriculum, Tenure, etc.

Served on the: Academic Policies & Standards Committee, College Curriculum Committee, Department Curriculum Committee, and three tenure committees. Academic Senator; Information Officer on the Senate's Executive Committee; Academic Vice President Search Committee; chair of the faculty search committees. Teach and assist fellow faculty with developing online course material via WebCT and Respondus through the Faculty Center for Teaching Learning.

Successfully proposed and received approval for professional development in the use of Maple T.A. by attending the 2105-Maple T.A. User's Summit by Maplesoft
Successfully initiated an investigation (20111208) that led to the pilot testing Maple T.A. (2013-2015) for the Ferris State University to determine that is a viable replacement for numerical / calculated questions so vital to assessing course material that depends on numerical / calculations. . (20150608)

Successfully proposed and executed a sabbatical titled "Professional development in Control Systems with auxiliary material generation" appropriate for a Control Systems oriented course. (Completed 2014)

Successfully worked with my School Director, a faculty member in the Mechanical Engineering, and the program secretary on a Mechatronics Curriculum. (2012-2014)

Delivered with Brian Brady-Mechanical a Mechatronics Institute (08, 2012)
Successfully completed a sabbatical regarding computer-based: measurement (data acquisition), data storage and retrieval, data analysis, for measurement and automation (08/2002-08/2003).

Have become a resource person to the Faculty Center for Teaching and Learning for developing online learning policies, online course development (primarily in the evaluation portion). I also teach other faculty how to utilize Respondus as part of the creation of evaluation questions and Maple TA. (2004-present)

Ronald A. Mehringer

405 Swan Building
915 Campus Drive
Big Rapids, MI 49307
Office: 231-591-3064
E-mail: RonaldMehringer@ferris.edu

Education

Master of Science, Industrial Engineering, University of Pittsburgh, Pittsburgh, PA, 1976
Master of Science, Electrical Engineering, Carnegie Mellon University, Pittsburgh, PA, 1973
Bachelor of Science, Electrical Engineering, Case Western Reserve University, Cleveland, OH, 1967

Teaching Experience

Program Coordinator EEET & CNS Department, College of Engineering Technology, Ferris State University, Big Rapids, MI, 2011 to present.

Professor, EEET & CNS Department, College of Technology, Ferris State University, Big Rapids, Michigan, 2014 to present.

Associate Professor, EEET & CNS Department, College of Technology, Ferris State University, Big Rapids, Michigan, 2009 to 2014.

Assistant Professor, EEET & CNS Department, College of Technology, Ferris State University, Big Rapids, Michigan, 2004 to 2009.

Industrial Experience

Vice President, Marshall Electronics Division, Pittsburgh, PA, 1987-2003

Project Manager, Marshall Electronics Division, Pittsburgh, PA, 1977-1987

Field Service Engineer, Marshall Electronics Division, Pittsburgh, PA, 1967-1977

(Marshall Electronics Division manufactures industrial communications systems, data transmission systems, factory automation systems and remote control systems)

Professional Societies

Member of Association of Engineering Educators (ASEE)

Life Member of the Institute of Electronic and Electrical Engineering (IEEE)

Awards

2005 Recipient of Ferris Foundation Exceptional Merit Grant

University Associations

Member of the Ferris State University Provost Search Committee

Chairperson of the College of Engineering Technology Dean Search Committee

Member of the Mechanical Engineering Department Faculty Search Committee

Member of the University Professional Development Committee

Member of the University Committee on Discipline

Member of the University Academic Policy and Standards Committee

Chairperson of the Curriculum Committee for the EEET/CNS Department

ROBERT MOST

EDUCATION

Master of Science, Electrical Engineering, Cornell University, Ithaca, NY 1988
Bachelor of Science, Electrical Engineering, Minor in Mathematics
GMI Engineering and Management Institute, Flint, MI 1987

ACADEMIC EXPERIENCE

FERRIS STATE UNIVERSITY 2009-Present
Associate Professor, College of Engineering Technology, Electronics / CNS Dept. (full time)
FERRIS STATE UNIVERSITY 2004-2009
Assistant Professor, College of Engineering Technology, Electronics / CNS Dept. (full time)
SAGINAW VALLEY STATE UNIVERSITY 1999-2004
Adjunct Professor, Department of Electrical and Computer Engineering (part time)

PROFESSIONAL EXPERIENCE

ALAMANDO ENTERPRISES 1999-Present
DBA, Self-employed Electronics Consulting

DOW CORNING CORPORATION 1996-2004
(full time) 1988-1990
Associate Engineering Specialist 2001-2004
Senior Project Engineer 1996-2001
Electrical Engineer 1988-1990

SAGIAN CORPORATION (full time) 1994-1996
Lead Hardware Engineer

THE DOW CHEMICAL COMPANY (full time) 1990-1994
Senior Research Engineer

GENERAL MOTORS CORPORATION, OLDSMOBILE DIVISION 1982-1987
Cooperative Education Student, Engineering

SELECTED ACCOMPLISHMENTS

UNIVERSITY:

- Secretary of the University Student Life Committee (2014-present)
- Member of the Faculty Center for Teaching and Learning's Faculty Advisory Group (member since 11/2006).
- Advisor to the FIRST Robotics Student Organization on Campus (2014-present)
- Recipient of The Ferris Foundation Grant (2007)

COLLEGE OF ENGINEERING TECHNOLOGY:

- Curriculum Committee Chairman (member 2007-2014, chairman 2014-present).
- Recipient of Timme Travel Grant (2007, 2009, 2011, 2013)
- Recipient of a Faculty Development Grant (2008, 2010, 2012, 2014)
- Participation in Ferris Technology Day at Bay Arenac ISD recruiting (2012, 2013, 2014)

EEET/CNS DEPARTMENT:

- Academic Program Review Chairman (through 2008)
- Curriculum Committee member (2004 – present)
- Tenure Committee (2009 – present)
- Creation of New Course – EEET-357 "Advanced Electronics" (2010)
- Collaboration with Grand Rapids Community College helping create EEET course
- Creation of the Bulldog Amplifier Kit for student recruitment
- Design and Fabrication of the Bulldog Sound Meter for display purposes in lab

IN-KIND DONATIONS TO UNIVERSITY

- US Air Force – Electronic equipment $99,500
- Microchip Corporation $2,000
- Texas Instruments $921
- Total Donations Coordinated: $102,421

PATENT DISCLOSURES:

Hardware Driving Scheme for Flexible Printable Electrochromic Displays, Aveso Inc., 2005.
Planar Pixel Timers Using Electrochromic Ink, Aveso Inc., 2005.

EXTERNAL PUBLICATIONS:

Hardware Watchdog Timer Accepts Range of Frequencies, ***EDN***, August 12, 2010
Spark Detector Uses Proximity, ***EDN***, November 27, 2008
Circuit Provides Synchronization for Flashing LEDs, ***Electronic Design***, October 28, 2004
Plasma Impacts to an Oxygen Doped Silicon Carbide Low-k Barrier Film, ***Journal of the Electrochemical Society***, (co-author – August, 2004)
Circuit Provides 4-20mA Loop for Microcontrollers, ***EDN***, May 27, 2004
Scalable Latch Requires no Capacitor or Clock, ***EDN***, August, 2004
The Physics of Dielectric Films, ***Semiconductor International***, June 2004
Also published in ***Wireless Week***, June 2004

OUTSIDE ACTIVITIES

- Mentor for FIRST Robotics High School Robotics Team (2009-present)
- Volunteer - Great Lakes Bay Science and Engineering Festival Delta College (2013, 2014)
- Appeared on local TV show discussing robotics actuated dinosaurs (2014)
- Technical review of Electronic Communication Textbook (McGraw-Hill)

JEFFREY PEDELTY

EDUCATION

Ferris State University
MS-ED **2014**
Thesis – Portfolio; Learning styles and disabilities

Ferris State University
BS Operations Management **1996**
Area of concentration: Manufacturing
Ferris State College
AAS Industrial Electronics **1989**

TEACHING EXPERIENCE

Ferris State University
Adjunct Professor **2012 - Present**
Provide instruction for Circuits one and Circuits two in the electronics department and Heavy Equipment Technology department

Baker College of Muskegon **2008 - 2012**
Department Chair for Electronics
Deliver instruction in Electronics, Electronics System Technology and Computing Technology programs. Primary advisor for all programs in the department.

Ferris State University
Adjunct Instructor **2006 - 2007**
Deliver instruction on electronic controls for HVAC

Mecosta-Osceola Career Center
Para-educator **1999 - 2006**
Maintain lab area for Electronics program

RELATED EXPERIENCE

DURA Automotive
Purchasing Agent – Cross functional engineering teams **1997 - 1999**
Fremont, MI
Manage a multimillion dollar budget working closely with

engineering departments and production in a tier one automotive environment while implementing over 5 million dollars in cost saves.

AVL Information Systems
Big Rapids MI – Sarnia Ontario
Senior Technician/Buyer **1994 – 1997**
Provide support to Engineering, design installation procedures, schedule and monitor production activities and perform production testing of GPS tracking systems

IFT Industries
Big Rapids, MI
Automation Technician **1992 - 1994**
The exclusive electronics technician in an automated wood working furniture plant

Hanchett Manufacturing
Manager/Customer Service of Raydyne Division **1989 - 1992**
Provide technological support, product development and promotion of dynamic vibration analysis equipment

Belco Industries
Belding Michigan
Field Engineer **1988 – 1989**
Provide support for automation systems and industrial combustion to customers in the aluminum extrusion and painting industries

CERTIFICATIONS
Vocational Authorized for Michigan Career Technology Centers

VOLUNTEER SERVICE
Faculty Advisor – Rube Goldberg team
Volunteer – Math Counts
Sound Engineer – Relay for Life and Take Back the Night
Audio/Video systems design – Paris United Methodist, 3rd Avenue United Methodist and Rodney United Methodist churches.
Consumer electronics repair – Volunteer work for senior citizens

Murry D Stocking

EDUCATION:
BS in Dec, 1972 from Michigan Technological University; Houghton, Mich. Major: Electrical Engineering-Power Option. Courses in AC Machines, DC Machines, Transformers, Transmission Line Design, Load Flow Analysis, Power System Analysis, and Magnetics.

2003: AB on-line course in PLC programming using RSLogix.

Green energy conference 2008 & 2009 at FSU

Alternative Energy Conference at Clare, MI 2005

AB seminars

Registered Professional Engineer in Michigan

EXPERIENCE:
Ferris State University, Big Rapids, Mich. Started Sept, 1983 as instructor. Present position is Assistant Professor.

Was Department Chair from Aug 2005 until Dec 2006 and Aug 2009 to Aug 2011

Have taught lecture and lab courses in AC and DC basics, Welding Power Supplies, Electronics, Motors, and Motor Controls. Have taught service courses for non-electrical majors. Have helped student groups.

Have presented many industrial training seminars in basic electricity and controls to local industry.

Grand Transformers, INC, Box 188, Grand Haven, Mich 49417 from Sept, 1976 until Dec, 1981 as Design Engineer. Custom designed power transformers from 1VA to 5kVA. This often required close customer contact to work out details of the design. Was responsible for prototype building and testing. Was responsible for a testing program to find new varnish for production.

Daverman Associates, INC, 200 Monroe, Grand Rapids, Mich from Jan 1973 until Jan 1975. Worked in the Study Department with REA Cooperatives of Michigan doing long range work plans, cost and rate studies.

COMMITTEES:

Department Tenure Committee 1990 to present

CET promotion committee; 2007-2009, 2003-2005

Department Curriculum Committee 2006 to present

GARETH B. TODD

Summary of Qualifications

Note: For the purpose of the ABET requirement of two-pages, nothing past the last ABET visit is listed in this vita (excluding education and work experience). Thirty years of teaching and work experience in industrial automation, aerospace industry, and automation education. This combined with administrative duties, consulting (in education and industry), military contracts, and supervision of hourly technicians round out a very successful career. Responsibilities have included on-line education, team leading/building, problem solving in hardware and software environments, hands-on system start-up and troubleshooting, curriculum development, committee service/chair, advising, scheduling, and budgeting. Also, for the past nine years, ABET coordinator for the EEET program at Ferris State University and certified ETAC-ABET Evaluator. Several industry publications and service to company, university and community are also achievements worth noting.

Education

Western Michigan University - Kalamazoo, Michigan
Admitted, Educational Leadership Ph.D. Program (2002-2003)

Northern Michigan University - Marquette, Michigan
M.S. Training and Development (2001)

Aviation, Flight School - Greenville, Michigan
Commercial Pilot – Instrument, Single Engine, Land (1991)

Northern Michigan University - Marquette, Michigan
B.S. Industrial Technology (1986)

Certifications

Mission Pilot – Civil Air Patrol Search and Rescue
General Class Amateur Radio Operator
Certified Ground Instructor (Aviation)
Commercial Class, Instrument Pilot, Single Engine, Land

Professional Development

Courses/Training

- Sabbatical – Create a Moodle Server (2013)
- Blackboard training (2013 Ferris)
- Moodle Webinar (2012)
- Rockwell Automation Webinars (2009 – present)
- Rockwell Automation On the Move (2008 - 2010)

Honors/Volunteer Work

- Captain and Mission Pilot – Civil Air Patrol Search and Rescue (2014 - Present)
- Awarded Sabbatical Leave Ferris State University Develop a Moodle Server (2013)

Memberships

- Civil Air Patrol
- Institute of Electrical and Electronics Engineers (IEEE)
- American Society of Engineering Education (ASEE).

Publications

Procedures and Manuals

- Standby Power Generation Maintenance Training Examination, (2015)
- How to build a low level Moodle Server, (2014)

Papers, Presentations, and Workshops

- Sabbatical Report – How to Build a Moodle Server, (2014)
- Implementing a Laptop Initiative at University Level, Ferris State University, (2009)

Teaching and Work Experience

August 2001 to Present – Ferris State University, Big Rapids, Michigan
January 1996 – August 2001, Northern Michigan University, Marquette, Michigan,
April 1994 – December 2004, Self Employed Consultant, Marquette, MI
July 1991–August 1993 Textron Defense Systems, Wilmington, Mass.
June 1986 – July 1991 Bell Aerospace Textron, Buffalo, New York.

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Curriculum Development

CORPORATE AND PROFESSIONAL DEVELOPMENT, FERRIS STATE UNIVERSITY (2013 – Present), Industrial Training Pneumatics and Controls

CORPORATE AND PROFESSIONAL DEVELOPMENT, FERRIS STATE UNIVERSITY, (2002 – Present) Hydraulics, Controls, Networks and Drives

FERRIS STATE UNIVERSITY, (2013) Industrial Motion Control and Industrial Process Communications, curriculum redesign per advisory board recommendation.

Administrative/Committee Activities

- Academic Senate (2012 – Present)
- Student Assessment of Instruction Revision Task Force (2011 – Present)
- Academic Program Review Council (2009 – Present)
- University Sabbatical Committee **Chair** (2008 – 2012)
- College of Technology Sabbatical Committee **Chair** (2008 – 2012)
- College of Technology Sabbatical Committee (2006 – 2012)
- Electrical/Electronics Engineering Technology and Computer Networks & Systems Curriculum Committees (2001 – Present)
- Student Advisor, summer registration and academic year (2001 – P

Appendix C – Equipment

1. Lab facilities consist of five laboratories:

    a. The Analog Multi-Purpose Lab is mainly used for introduction to electronics and data acquisition. Each station is equipped with the general tools needed for analog testing and PC data acquisition. It consists of 9 student stations plus 1 instructor station where each station contains: NI Elvis, oscilloscope, 3-output power supply, 2 DMMs, function generator, 120v variAC, and isolation transformer. Resources available in the room: fixed voltage 3 phase power; analog meters; decade boxes of resistance, capacitance, and inductance; curve tracers; LC meter; soldering equipment; and Feedback equipment containing amplifiers, sensors, and motors.

    b. The Automation Power Lab provides controlled three phase power, PLC training with controlnet, devicenet, ethernet networks, the Universal Laboratory Machine for large motor control, and provides compressed air for some of our industrial automation projects. It contains 9 student stations providing: PC, oscilloscope, two power supplies, DMM, function generator, and universal counter, variAC 3 phase power, and 8 stations of the Universal Laboratory Machine. Resources available in the room are: decade boxes of resistance, capacitance, and inductance, analog meters, watt meters, clamp-on amp/watt meters, 3 phase light fixtures, generators, Motors, PLCs (PLC I/O, controlnet, devicenet, Ethernet, displays, servo controllers), automation parts (relays, switches, sensors, etc.), and house compressed air.

    c. The Communications Lab is used for communications, troubleshooting, and microprocessor training. Each of the 9 student stations is equipped with the general tools needed for analog testing and data acquisition with access to communication test equipment and microprocessor. Each station contains: PC, NI Elvis, oscilloscope, two 3-output power supplies, 2 DMMs, and function generator. Resources available in the room: decade boxes of resistance and capacitance, LC meter, M68HC11 trainers, breadboard trainers, spectrum analyzer, transistor testers, RF generators, AM/FM stereo analyzers, distortion analyzer, signal generators, counters, isolation transformers, and 120v variAC.

    d. The Industrial Lab provides compressed air for some of our industrial automation projects, relay training and small motor control. 8 student stations contain: PC, oscilloscope, 3-output power supply, DMM, and function generator. Resources available in the room include: fixed voltage 3 phase power, house compressed air, decade boxes of resistance and capacitance, analog meters, variACs, relay trainers, motor controller trainers, Petra automation factory, PLCs, automation parts (relays, switches, sensors, etc.).

e. The Multi-Purpose Lab is a general purpose lab where most of the equipment is not fixed to the bench. This is mainly the microprocessor, programming and digital lab with logic analyzers and software programming packages. Equipment is usually set up and available dependent on the project. 12 student stations contains: PC and NI Elvis. Resources available in the room: oscilloscopes, function generators, DMMs, power supplies, uP trainers, logic analyzers, pulsers, probes, and universal programmers.

Appendix D – Institutional Summary

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
Dr. David L. Eisler, DMA
President

Name and title of acting on behalf of the President
for accreditation policies, site visits, etc.:
Dr. Paul Blake
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

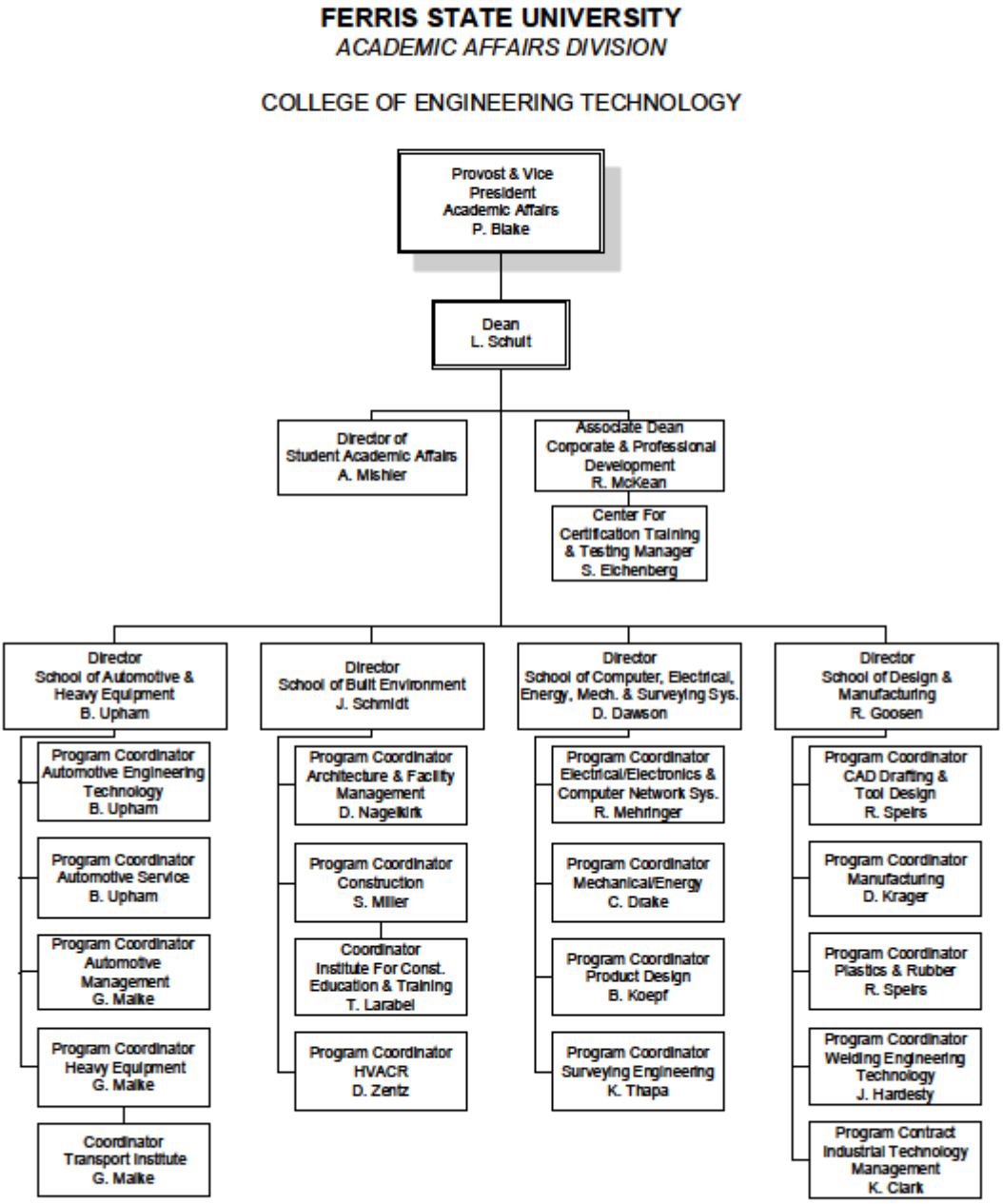
State of Michigan Public Four-Year Institution

Please see organizational charts for Academic Affairs Division and the College of Engineering Technology on the proceeding pages. Note that these documents are reproduced from FSU Fact book and are updated annually.

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



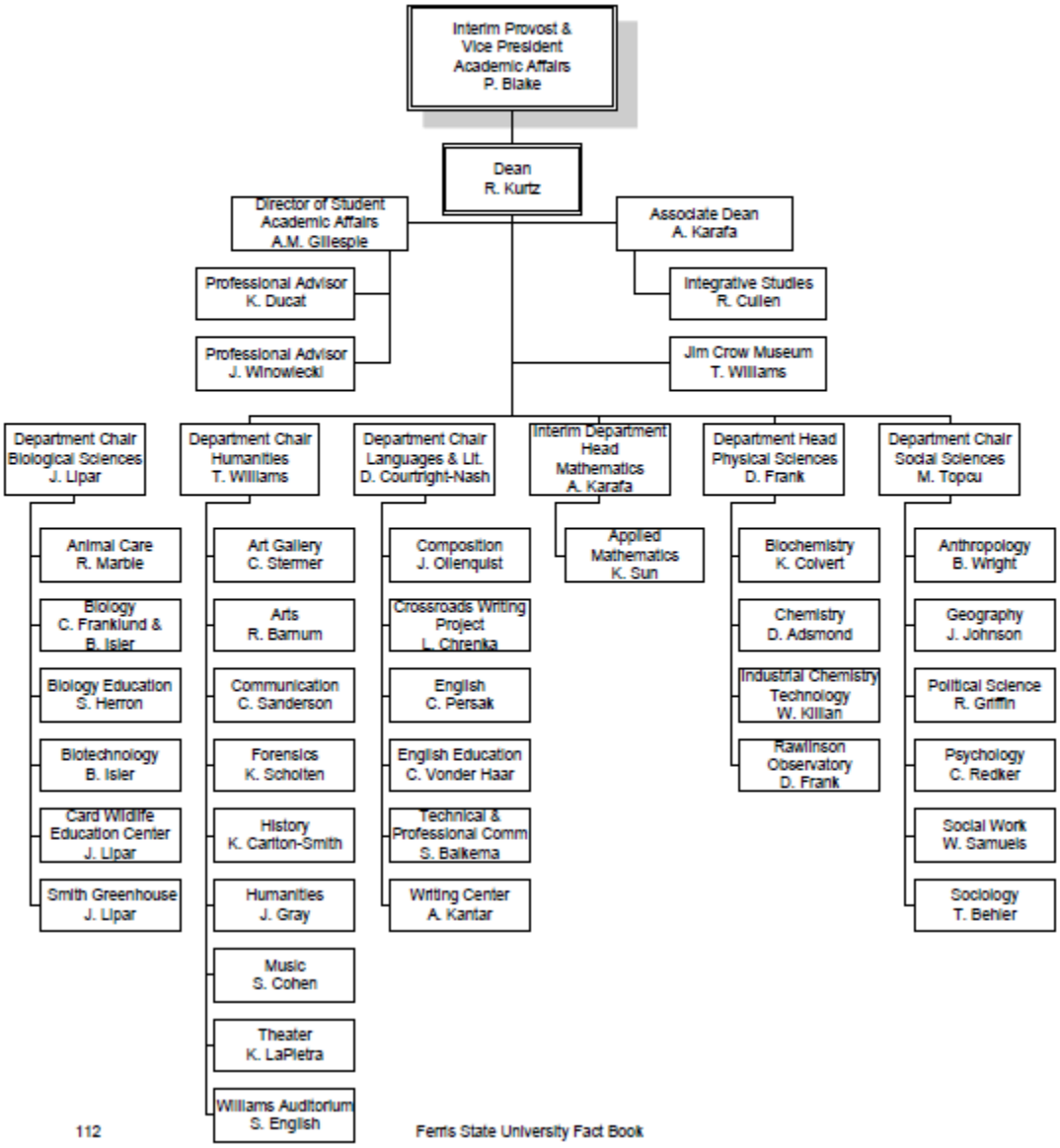
4. Academic Support Units

Here at Ferris State University, classes are taught by professors, not graduate assistants. The great majority of those classes are taught in small groups, not big lecture halls. Ferris has a 98 percent job placement and students will enjoy 200 student organizations for fun in a relaxed, hometown setting in the heart of Michigan's recreation area.

FERRIS STATE UNIVERSITY

ACADEMIC AFFAIRS DIVISION

COLLEGE OF ARTS & SCIENCES



5. Non-academic Support Units

IT Services - John Urbanick – Chief Technology Officer - 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.

Educational Counseling and Disabilities Services – Debra Cox – Academic Department Head - Educational & Career Counseling Center (ECCC): ECCC 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.

Structured Learning Assistance – Karen Royster James – Supervisor-ASC/SLA - 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.

Ferris State University Seminar – Shelly VandePanne – Director of Student Academic Affairs - 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.

Counseling Center – Renee Vander Myde – Director Counseling and Health Centers - Counseling Center (CC): The CC staff builds on the foundation that personal counseling is a therapeutic and educational experience for students in their personal and academic growth. The CC also assists students who are experiencing more serious forms of stress and disruption to their normal functioning by utilizing a varEEITy 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.

Ferris Library for Information, Technology and Education (FLITE) – Scott Garrison – Dean of the Library:
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.

Scholarships – Sara Dew – Director of Financial Aid. 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.

Student Organizations – Angela Roman, Director for Center of Leadership/Career Services. 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.

Student Employment & Career Services assists students in finding on-campus, local off-campus, summer, internship, and full-time positions. Through SE&CS, 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. In addition, 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. SE&CS 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.

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.

7. Tables

Table D-1. Program Enrollment and Degree Data

Electrical/Electronics Engineering Technology (Bachelors)

Academic Year			Enrollment Year 1st	2nd	3rd	4th	5th	Total Undergrad	Total Grad	Degrees Awarded Bachelors
Current 2014/2015		FT						59		15
		PT								
1 2013/2014		FT						45		7
		PT								
2 2012/2013		FT						31		12
		PT								
3 2011/2012		FT						29		13
		PT								
4 2010/2011		FT						29		13
		PT								

Industrial Electronics Technology (Associates)

Academic Year			Enrollment Year 1st	2nd	3rd	4th	5th	Total Undergrad	Total Grad	Degrees Awarded Associates
Current 2014/2015		FT						65		3
		PT								
1 2013/2014		FT						61		12
		PT								
2 2012/2013		FT						40		9
		PT								
3 2011/2012		FT						48		11
		PT								
4 2010/2011		FT						47		4
		PT								

FT--full time
PT--part time

Table D-2. Personnel

Electrical/Electronics Engineering Technology

Year[1]: __2014-2015_____

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[2] (Director + Program Coordinator)	2 [100%] [50%]		
Faculty (tenure-track)[3]	66		
Other Faculty (excluding student Assistants)	1		
Student Teaching Assistants[4]			
Technicians/Specialists			
Office/Clerical Employees	1		
Others[5]			

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**