ABET
Self-Study Report
for the
Bachelor of Science in Electrical Engineering
at
Lamar University
Beaumont, Texas

July 2012

CONFIDENTIAL

The information supplied in this Self-Study Report is for the confidential use of ABET and its authorized agents, and will not be disclosed without authorization of the institution concerned, except for summary data not identifiable to a specific institution.
Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKGROUND INFORMATION</td>
<td>3</td>
</tr>
<tr>
<td>CRITERION 1. STUDENTS</td>
<td>6</td>
</tr>
<tr>
<td>CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES</td>
<td>13</td>
</tr>
<tr>
<td>CRITERION 3. STUDENT OUTCOMES</td>
<td>17</td>
</tr>
<tr>
<td>CRITERION 4. CONTINUOUS IMPROVEMENT</td>
<td>20</td>
</tr>
<tr>
<td>CRITERION 5. CURRICULUM</td>
<td>26</td>
</tr>
<tr>
<td>CRITERION 6. FACULTY</td>
<td>32</td>
</tr>
<tr>
<td>CRITERION 7. FACILITIES</td>
<td>41</td>
</tr>
<tr>
<td>CRITERION 8. INSTITUTIONAL SUPPORT</td>
<td>51</td>
</tr>
<tr>
<td>CRITERION 9 PROGRAM CRITERIA</td>
<td>54</td>
</tr>
<tr>
<td>APPENDIX A – COURSE SYLLABI</td>
<td>57</td>
</tr>
<tr>
<td>APPENDIX B – FACULTY VITAE</td>
<td>58</td>
</tr>
<tr>
<td>APPENDIX C – EQUIPMENT</td>
<td>88</td>
</tr>
<tr>
<td>APPENDIX D – INSTITUTIONAL SUMMARY</td>
<td>101</td>
</tr>
<tr>
<td>SIGNATURE ATTESTING TO COMPLIANCE</td>
<td>110</td>
</tr>
</tbody>
</table>
BACKGROUND INFORMATION

A. Contact Information

Harley R. Myler, Ph.D., P.E.
Professor & Chair
Phillip M. Drayer Department of Electrical Engineering
MS 10029
Lamar University
Beaumont, TX 77710-0029

409-880-8747 (direct) 409-880-8746 (dept) 409-880-8121 (fax)
h.myler@lamar.edu

B. Program History

The Lamar University Electrical Engineering Department (LUEE) began graduating students with the BSEE in 1953, two years after Lamar State College of Technology became a four-year university. The school was renamed to Lamar University in 1971. A Master of Engineering Science (with thesis) degree was first offered in 1962 and a Master of Engineering (non-thesis) was approved in 1968. In 1973 the College of Engineering awarded the first Doctor of Engineering degree.

The Engineers Council for Professional Development granted accreditation for the BSEE at Lamar on November 8, 1958 and the department has retained accreditation since then. There are six faculty in the department, two full professors, three associate professors and one assistant professor. Of these faculty, one is an endowed chair. LUEE has always maintained a strong commitment to instructional excellence and an unofficial department motto is the well-known saw: research is inseparable from informed teaching.

C. Options

None.
D. Organizational Structures

Lamar University
President
Dr. James M. Simmons

Executive Associate to the President
Ms. Joy K. Tate
880-8405

Provost and Vice President for Academic Affairs
Dr. Stephen Dobkin
880-8398

Vice President for Finance and Operations
Dr. Gregg Lassen
880-8395

Sr. Associate Vice President for Student Affairs
Mr. Norman Bellard
880-8411

Vice President for University Advancement
Ms. Camille Mouton
880-8303

Interim Athletic Director
Mr. Jason Henderson
880-8201

Assistant to the President
Dr. Cruse Melvin
880-8506

- Associate Vice President for Academic Affairs
- Distance Education
- Institutional Research and Planning
- Academic Services: Registrar, Admissions, Recruiting
- Center for College Readiness: Retention, Undecided, Advising
- Graduate Studies and Research
- Texas Academy of Leadership in the Humanities
- Honors Program
- Finance: Accounting, Budget, Estate, Grants, Payroll, Purchasing, Student Financial Aid, Cash Management, Investments
- Student Development Services: Residency, Food Services
- Bookstore
- Student Center
- Health Center & Student Health Services
- Career Development & Placement
- Recreational Sports
- University Press
- University Government
- Montana Center

- Advancement Services
- Alumni Affairs
- Development
- Public Relations
- University Reception Center

LUEE

Phillip M. Dwyer
Department of Electrical Engineering

Jack Hopper, Ph.D., P.E.
Professor & Dean
College of Engineering

Steven Dobkin, Ph.D., P.E.
Provost & Vice President of Academic Affairs

James Simmons, Ed.D.
President

Harley B. Myler, Ph.D., P.E.
Professor & Department Chair
William B. and Mary G. Mitchell Endowed Chair

Jane Capps
Administrative Associate

Michael Fuller
Lab Manager

Wendell Ileen, Ph.D., P.E.
Professor
Undergraduate Advisor

Rubal Wang, Ph.D.
Associate Professor
Graduate Advisor

G. N. Reddy, Ph.D.
Associate Professor

Sehatbatu Sudd, Ph.D.
Associate Professor

Erik Thomsen, Ph.D.
Assistant Professor
E. Program Delivery Modes

The Bachelor of Science Program in Electrical Engineering is a day program. The LU academic calendar comprises two 16-week semesters during a standard academic year and typically students take five to six courses per semester. All undergraduate courses are offered during the day in traditional lecture and laboratory formats. Students may choose cross-listed graduate courses as electives that may be offered in the evening hours. Students also have opportunities to take on-line courses to satisfy general studies core requirements although no electrical engineering courses are offered online.

F. Program Locations

Main campus, 211 Redbird Lane, Beaumont, TX 77710.

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

None.

H. Joint Accreditation

The LUEE program is not jointly accredited nor is seeking joint accreditation by more than one commission. The program is accredited under the umbrella of the Lamar University Southern Association of Colleges and Schools (SACS) accreditation, which was reaffirmed in 2008.
CRITERION 1. STUDENTS

A. Student Admissions

At Lamar University, we define the Lower Division as the set of courses normally taken in the first four long semesters of the Electrical Engineering (EE) program as defined by our curriculum. The Upper Division is defined as that set of courses taken in the last four semesters. As such, the EE program admits students in the initial semester of attendance if the following criteria have been met in order to qualify for unconditional admission to Lamar University.

Students must do three things to qualify for unconditional admission to Lamar University.

1. Receive a diploma from an accredited high school.
2. Complete at least 14 high school credits in college preparatory courses: 4 credits in English, 3 credits in mathematics, 2 credits in laboratory sciences, 2 ½ credits in social sciences (U.S. history, U.S. government, and world history or world geography) and 2 ½ credits in college preparatory electives (preferably including 2 credits of foreign language).
3. Graduate in the top 10 percent of their high school class or achieve a minimum composite score on the SAT or ACT.

Admission Standards of Lamar University

<table>
<thead>
<tr>
<th>High School Class Rank</th>
<th>SAT (Math + Critical Reading)</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 10%</td>
<td>No minimum required</td>
<td>No minimum required</td>
</tr>
<tr>
<td>Top 11% -25%</td>
<td>850</td>
<td>18</td>
</tr>
<tr>
<td>2nd Quarter</td>
<td>930</td>
<td>20</td>
</tr>
<tr>
<td>Bottom Half</td>
<td>1,000</td>
<td>21</td>
</tr>
</tbody>
</table>

Application material must be submitted no later than August 1st for fall and no later than January 2nd for spring.

All decisions regarding admission to the university are handled through Lamar University’s Admissions Office. The applicant’s admission application and required documentation is data entered into the Banner system. Banner has a university approved set of admissions decision rules and an admissions decision calculator which evaluates admission data and insures each applicant complies with Lamar University’s admission standards.
**Individual Approval Admission**

First-time applicants who do not meet unconditional admission requirements will be considered on an Individual Approval basis. Students accepted for Individual Approval admission will have a variety of enrollment conditions that are intended to enhance their opportunities for success at Lamar University. During registration for classes, Individual Approval students will meet with an academic adviser who will explain the guidelines, agreements and requirements necessary for enrolling at LU.

**Two-Step Admissions Process**

The College of Engineering has a two-step admissions process. Students may receive unconditional admission or admission via individual approval into the University and College of Engineering as a provisional engineering student. Students are then advanced to the professional program when they meet the following specific requirements: min. overall GPA 2.25, 51 hours completed in the first two years, and all pre-requisite courses taken. The College of Engineering Advising Office checks these criteria and advances students to their respective department.

**B. Evaluating Student Performance**

For the first two years of all engineering programs, the College of Engineering Advising Office (CEAO) advises/supervises these students.

Enforcement of pre-requisites happens during advisement and registration. Students cannot register without first being advised by the CEAO. Prerequisite are also enforced through our computer registration system.

Since a student is allowed to register before the grades are posted, the CEAO makes every effort to review grades to determine if the provisional student is indeed eligible to take the courses he/she is registered for. If not eligible, the student is informed that a schedule change is necessary and CEAO assistance is available. Also, the CEAO double checks to make sure the necessary changes have been carried out before the beginning of the next semester.

Every semester, the CEAO obtains a report of final grades for provisional students, the degree plans updated, and GPA assessment conducted. Provisional students are instructed to maintain a 2.25 or above GPA (out of 4.0). Students are informed that if their GPA falls below 2.0, they will be put on probation, moved into a probation category, and required to participate in Lamar University’s STARS Program (Student Advising and Retention Services) where they will receive additional academic supervision.

After students have been advanced from provisional status to their professional program, the Electrical Engineering Department Undergraduate advisor is responsible for checking that pre-requisites are met on junior and senior classes. The advisor reviews all student progression with the assistance of the Department Administrative Associate. Unusual cases or issues are flagged to the department chair for action.
Student Advising and Retention Services (STARS)

STARS is a University level program available to students in order to help them throughout their educational career. STARS services include, but are not limited to: intrusive and proactive advising, tutoring, supplemental instruction for certain subjects, and mentoring. STARS maintains an Early Alert program designed to provide intervention services to students who are identified as having academic difficulty or as having potential for academic difficulty. Such at-risk students include those:

- In danger of probation
- Returning from an extended absence
- Having a GPA of 2.5 or below
- Referred by a University employee
- Who have transferred
- Who have referred themselves

Probation

Students whose cumulative grade point average (GPA) falls below satisfactory academic progress, identified by a 2.00 or higher cumulative GPA, are placed on academic probation. The STARS program was instituted to help students on or near academic probationary status, through the following process:

1) Identify those students required to participate in STARS (GPA below 2.0).
2) Place registration hold on student’s account which restricts the student's ability to register for future semester until after they have been advised by a STARS advisor.
3) Students who wish to continue their studies, must sign a Contract for Academic Success.

Academic Progress Toward Graduation

Students who are on academic probation must maintain academic progress toward graduation in order to avoid suspension. This means that a student whose cumulative GPA is below a 2.0 must earn a 2.0 term or semester GPA each semester until the cumulative GPA is above 2.0 meaning that the student is back in academic good standing.

Suspension

A student on probation who does not demonstrate academic improvement (i.e., lower than a 2.00 semester/term GPA) and/or fails to comply with any other condition of the action plan during the next semester/term of enrollment will be academically suspended from Lamar University or, with approval from the academic dean, be placed on continued probation and subject to a new academic action plan. A student subject to his or her first academic suspension must serve a long semester (fall or spring) or entire summer (summer mini, summer sessions I-IV) suspension before returning to Lamar University. Upon return, the student will be placed on probation and subject to a new academic action plan. A second suspension will result in a two-semester suspension, and a third suspension will result in expulsion from Lamar University.
Any courses completed at other colleges or universities—including the Lamar two-year institutions—during periods of suspension will not be accepted by Lamar University as transfer credit.

C. Transfer Students and Transfer Courses

Students transferring to Lamar University from another institution must have a minimum GPA of 2.0. Courses for which a C or better is earned are eligible for transfer. Students enter the provisional engineering program and are advanced to the professional program when they meet the requirements (min. overall GPA 2.25, 51 hours completed in first two years, prerequisites courses taken).

In each case, the University Transcript Evaluator in the Admissions Office evaluates each course as directly equivalent or non-equivalent to a Lamar University course (by comparing course content from the other institution’s general catalog) and/or based on previous input from faculty or department chairs. If previous input is not available, the course is listed as non-equivalent.

Credit for non-equivalent Engineering courses is decided by the Electrical Engineering Department Chair. A copy of the approved Lamar University Undergraduate Course Substitution Request is retained in the student’s records in the department, with an approved copy going to the Records Office for use at graduation. The Electrical Engineering Department Chair may assign direct equivalent credit for a non-equivalent course by examining further evidence such as course syllabi, texts and student’s knowledge of the content of a particular course along with consultation with the faculty member(s) teaching the course.

Transfers from community/junior colleges are limited to 66 semester hours or the number of hours required by the university during the freshman and sophomore years in the degree plan in which the student plans to enroll. No lower-division (1000 or 2000 level) college credits will be considered for transfer as upper-division (3000 or 4000) credits.

All students must complete a minimum of 45 credit hours of upper-division (3000-4000) courses at Lamar University to earn a degree from Lamar (25 credits minimum in their major).

D. Advising and Career Guidance

The College of Engineering Advising Office (CEAO) handles the one-on-one advisement of all provisional engineering students at the freshman and sophomore levels, as well as deals with transfer students coming to the College of Engineering. Students are required to visit at least twice a year for mandatory advisement and to select their schedules.
The Senior Academic Advisor has over 8 years of experience in the advisement process for the College of Engineering. The second Academic Advisor has 1 year of advising experience. Both are familiar with Lamar University and the College of Engineering policies. They also have knowledge of Lamar academic programs and personnel external to the College of Engineering. They report to the Dean of Engineering and interact with the Chair of the Engineering Departments in a collaborative and supportive role. They have knowledge of the lower division curriculum in the undergraduate engineering programs and a familiarity with high school prerequisite courses and test scores recommended as preparation for the engineering programs. The CEAO handles all prerequisite checks for all freshman and sophomore level students. The office also employs two part-time student workers who assist with routine clerical duties, answer phones, make appointments, and greet visitors.

The College also provides proactive counseling to encourage students who may be better suited for other major to pursue those majors. The intent is to furnish counseling to students before they acquire a GPA deficiency which would ultimately prohibit them from completing any degree.

The CEAO also maintains a system to obtain and report statistical student information by major and classification, including retention data for use in program planning and ABET accreditation.

Students are advanced to the electrical engineering program from the CEAO when they have completed a minimum of 51 hours of the common engineering core program with a minimum overall grade of 2.25. Please see the section below on Upper Division Advising.

College of Engineering Cooperative Education Office

A Cooperative (Co-op) Education program, in which the student spends alternate semesters at work and at study, is offered to qualified students in the College of Engineering. This program is administered through the Engineering Cooperative Education office located within the College of Engineering. Internship for work periods in summer terms only are also offered. Programs are available for engineering and industrial technology students. Students must meet the eligibility requirements of the program which include a minimum 2.5 overall grade point average and be at least a sophomore student in their respective engineering program. To remain in the program, the student must maintain at least a 2.5 overall GPA and perform in a manner satisfactory to the employer and Lamar University. During each co-op work term, the student is required to enroll in a three semester hour Career Development course and is considered a full-time student at Lamar University. This course is an engineering course, but is not part of the engineering degree plan. Industrial Engineering and Mechanical Engineering co-op students who successfully complete three Career Development courses may receive credit for one three credit hour elective.

In addition, students are required to post their resume through Cardinal Connect, a web-based job posting and resume referral service. Job postings are constantly updated through Cardinal Connect and students are informed of companies interviewing on campus throughout the year. Job postings are sent to the Department Chairs as well as individual
students who meet specific criteria for these opportunities. The Director of the Cooperative Education Office routinely meets with students about opportunities in Cooperative Education and informally offers career advice as needed.

University Career and Testing Center

The University Career and Testing Center offers services to College of Engineering students throughout their college career and specifically aids students in finding full-time employment. The University Career and Testing Center works collaboratively with Department Chairs, Student Organizations and the Dean’s Student Advisory Council in planning two Engineering and Technical Invitational Career Events each year, which typically brings in thirty plus companies at each event. A general Fall Job Fair and Spring Texas Job Fair are also opportunities for students to obtain full-time positions. The University Career and Testing Center also offers career exploration and career planning, resume design and critique services as well as Workshops to all College of Engineering students throughout the Academic year. The Testing Center offers a full functioning Prometric Lab where students can sit for professional, licensure and certification exams. The most active for the College of Engineering are:

Prometric Services:

- ASME – American Society for Mechanical Engineers
- BP US Pipelines and Logistics
- CAENG – California Engineers
- GRE – Graduate Record Examination
- IEEEB – Institute of Electrical and Electronics Engineers Biometrics
- INCSE – International Council on Systems Engineering
- WCET – Wireless Communication Engineering Technologies

Upper Division Advising

When students are admitted to the Upper Division of the Electrical Engineering program, they are assigned to our undergraduate faculty advisor. They must meet with the advisor at least once a semester on a formal basis before they are allowed to register for the next semester. The advisor makes sure that the student has completed the required prerequisites for each course they register for, although there is automated cross-checking in the registration computer program. A multi-part Advisement Form is completed and signed by the student and advisor. One copy is placed in the student's file and the other is kept by the student as it includes their course schedule.

Academic advising is individualized for each student in order to cover the following aspects of their academic lives, including but not limited to, the following:

- Course choices and selection, and degree requirements;
- Regulations, policies, and procedures on transfer credits, and transfer curricula;
• Information on scholarships, co-op work opportunities, fellowships, and undergraduate research opportunities;
• Issues surrounding balancing their work schedules and part-time working;
• Insights into their individual behaviors which may or may not be indicative of future success in their engineering degree, such as whether or not they are actually suited for this particular degree if they are displaying a pattern of repeating too many classes.

Students may request an exception or substitution to their degree plan and/or a waiver of prerequisites or co-requisites by filling out a form and having it reviewed by the Chair of the Department. Any disputes may be appealed to the Dean of the College of Engineering.

**Graduation Time:** It typically takes a full-time student four years to complete the undergraduate curriculum assuming that no courses are failed and enrollment was possible in the required courses. The College Advisement Office works closely with the department and other colleges in the university to guarantee that required courses will not conflict. For those students who are attending on a part-time basis, it usually takes between five to six years to complete the requirements for the B.S.E.E. degree.

<table>
<thead>
<tr>
<th>Commencement</th>
<th>BSEE Degrees Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring, 2011</td>
<td>20</td>
</tr>
<tr>
<td>Summer, 2011</td>
<td>1</td>
</tr>
<tr>
<td>Fall, 2011</td>
<td>2</td>
</tr>
<tr>
<td>Spring, 2012</td>
<td>18</td>
</tr>
</tbody>
</table>

**E. Work in Lieu of Courses**

A student seeking credit for *work in lieu of courses* must appeal to the department in which courses are offered that the student wishes to replace. LUEE accepts the decisions made by other departments if the courses replaced are used in the BSEE program of study. Work in lieu of courses can include military or industrial training, self-study, or on-line courses from other sources than Lamar University. Students wishing to submit work in lieu of taking LUEE courses must request such in writing to the Department Chair under the guidelines of the university Advanced Standing Examination (ASE) policy. A copy of the policy is available from the department.

**F. Graduation Requirements**

The name of the degree awarded is the *Bachelor of Science in Electrical Engineering*. The requirements for graduation consist of completion of the 124 credits defined in the BSEE curriculum as maintained by the department and available for examination at any time in the Lamar University Catalog, which is posted online at the university website. When a student has reached their final semester of study, the department conducts a program audit of the student transcript. This audit is initiated by the student and conducted by the LUEE Administrative Associate. The degree plan audit form is then reviewed for completion and
signed off by the LUEE Undergraduate Advisor. It then is supplied to the chair for final review and signature approval and then to the dean. An example of this form is shown below.

### G. Transcripts of Recent Graduates

The program has provided a transcript of a 2011 graduate to the Team Chair at his request. The degree plans for graduates as described above in Section F is available for review in the department records.
CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

University Mission Statement

Lamar University is a comprehensive public institution educating a diverse student body, preparing students for leadership and lifelong learning in a multicultural world, and enhancing the future of Southeast Texas, the state, the nation, and the world through teaching, research and creative activity, and service. (Revised Jan. 4, 2006)

College of Engineering Mission Statement

Our mission is to provide an environment and infrastructure to support the educational objectives of the College of Engineering programs. The College establishes an interface to the University and the entities external to the University to provide and prepare engineering students to be leaders and problem-solvers. The College supports a foundation of strong theoretical emphasis, the development of practical engineering skills, experience in interpersonal communication and teamwork, and an emphasis on ethics, professional conduct and critical thinking. We offer strong and varied academic programs to a diverse student population that prepares our graduates for the challenges of lifelong learning.

Program Mission Statement

The Department of Electrical Engineering supports the mission of the College of Engineering and of Lamar University through teaching, research and service designed to provide the very best undergraduate electrical engineering education possible. It is our goal to provide our students with a strong theoretical foundation, practical engineering skills, experience in interpersonal communication and teamwork, and a daily emphasis on ethics, professional conduct and critical thinking. We prepare our graduates for successful engagement in commercial and industrial enterprise, research and development, and graduate study. We emphasize and support the training necessary for practice as professional engineers.

B. Program Educational Objectives

The educational objectives of the Lamar University Electrical Engineering Program are that we expect our graduates a few years after graduation to attain:

… successful and productive engineering careers, with emphasis on technical competency and with attention to teamwork and effective communication.

… successful pursuit of graduate studies and life-long learning in electrical engineering and related fields.
...a state of professionalism with development of professional ethics, professional licensing, and active participation in the affairs of the profession.

The LUEE Program Educational Objectives along with other accreditation materials are available on the department webserver accessed at http://ee.lamar.edu

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

The Lamar University mission speaks to the preparation of students for leadership and life-long learning in a multicultural world. This involves providing students with the skills and knowledge they need to contribute to the state and national economies, and to lead satisfying lives. The LUEE Program Educational Objectives expect graduates of the program to receive a solid foundation in the principles of electrical engineering, industry-relevant training, and a desire for life-long learning, which is consistent with the mission of the University. Given this preparation, students graduating from our undergraduate program are well prepared to compete for jobs in the technology sector at both the local and national levels. Furthermore, by providing this level of talent, we are helping to fuel the growth of the high-technology industries that are so vital to the state of Texas, the nation and the world.

D. Program Constituencies

The LUEE program constituencies include alumni, employers, and students. The relevance of each constituent group is briefly summarized below.

**Alumni:** LUEE graduates are a result of the instruction presented to them by the electrical engineering program. While in the program, we often tell them that "their success is our success" to emphasize the collaborative nature of the program in terms of a team effort in helping them achieve their educational goals. As such, the input of those same students once they become alumni is of extreme importance to the program in that it provides direction and feedback for current students. We strive to maintain a strong working relationship with our alumni and the fact that they respond in kind is a testament in itself to their satisfaction with the program and their own desire to see the program continue to be successful.

**Employers:** The employer constituency provides invaluable information regarding what skills and attributes LUEE graduates should possess to be competitive in the engineering workforce. Recruiting at Lamar University is problematic given that the university is relatively small and LUEE is a small department. For this reason, companies tend to avoid sending their recruiting teams because the return in terms of hiring will be low compared to the major institutions of the state. That said, we are recruited yearly by large companies such as National Instruments, Exxon-Mobil, BP, and others because our alumni working at those companies volunteer to return to our campus and recruit our students.
Current Students: Students provide the most immediate input for program activity in the department, but their input must be tempered carefully since it may be founded on self-motivating interests that are not consistent with the goals of the department. Nevertheless, their input is extremely valuable for isolating problem areas with short time constants where changes can be effected and evaluated immediately.

Our first program objective, and it should be noted that the objectives are not ranked, which is to prepare our students for successful and productive engineering careers, with emphasis on technical competency and with attention to teamwork and effective communication attends to the needs of alumni in that they leave the program well-prepared for their careers. It is an understood principle of engineering that few projects are produced by independent engineers working in a professional vacuum. Teamwork and communications skills are essential to a successful career. This fact is not lost on employers, who have emphasized to us their need for engineers that have had training and opportunity to exercise these skills. Lastly, the needs of our students are addressed because they are training for productive, successful and fulfilling careers as electrical engineers.

Our second objective, to prepare our students for the successful pursuit of graduate studies and for life-long learning in electrical engineering and related fields attends to the needs of alumni in that many choose graduate study prior to entering the workforce. Preparation for graduate study is not exclusive of preparation for work at the BSEE level only, but is supportive of the notion of life-long learning, which is an essential activity of all successful engineers at any level. Employers need engineers who recognize the importance of continuing education as their businesses are in constant need of being agile in the marketplace in terms of rapidly changing technologies. Our students, as a collective, rarely come into engineering study understanding this need, but they leave the program fully aware of it's importance and how they can address it.

Our third objective, to instill in our students a sense of professionalism with encouragement of professional ethics, professional licensing, and active participation in the affairs of the profession, is something that our alumni regularly encounter in their careers. Some go on to work in engineering consultancies and thus encounter a need for professional registration. Those not pursuing licensing still must conform to the demands of the profession in terms of quality of service, ethical behavior and active participation in professional organizations such as the IEEE. Employers, regardless of company type, have need for engineers not only with technical competence as addressed in our other objectives, but with an engineering work ethic that supports the company mission to excel in the marketplace while conforming to the laws that govern our society and our profession. These same needs are met with our students who seek to become accepted members into the electrical engineering profession.

E. Process for Revision of the Program Educational Objectives

Program Educational Objectives are reviewed yearly at meetings of our Advisory Council. The council is comprised of alumni, employers and faculty. Results of changes to the ABET EAC, surveys, student inputs and any opinions developed by members of the council are
discussed and changes implemented by consensus. This data is recorded in the minutes of the
council meetings, which are retained during the accreditation cycle and are available for
review. The only change made in the prior six-year cycle was a wording change from *endow*
to *instill* in the third objective. That change has been superseded by a change to the overall
wording due to changes in the EAC specifying *expectation* rather than *preparation.*
CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

The educational outcomes that our students can expect to derive from the Lamar University Electrical Engineering Program are the following:

(a) an ability to apply knowledge of mathematics, science, and engineering

(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) an ability to function on multidisciplinary teams

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) a knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The outcomes are documented on our website http://ee.lamar.edu and the course-to-outcomes mapping documentation may be found there as well as the syllabi for individual courses. Faculty also include mapping data on assignments, quizzes and exams.

B. Relationship of Student Outcomes to Program Educational Objectives

Our Program Objectives encompass three major themes: professional preparation, life-long learning, and professional conduct. Professional preparation is addressed specifically by the outcomes that address application, design and identification. We have what may best be described as a traditional program. Math and science make up the bulk of our non-engineering curriculum and we transition our students from those topics as viewed by the
scientist to the view of the engineer. This is done with our foundational coursework that engages the student with circuits, electronics, signals and systems, electromagnetics and computers—fundamental paradigms of electrical engineering. The program also emphasizes communication skills, teamwork and an understanding of global issues facing today's engineer. Our curriculum includes eight semesters of electrical engineering laboratory work. Labs exercise teaming and communications skills along with technical skills and learn-by-example paradigms. The teaming aspect also evokes notions of peer learning, a method that is recognized by pedagogic theorists and practitioners as a successful strategy for learning.

We identify two components to life-long learning, that of both formal and informal continuing education. Graduate programs and professional degrees are examples of formal programs of life-long learning that, in general, require the degree holder to stay current by virtue of their position—lawyers, physicians, researchers and faculty in higher-education. We encourage our students to study beyond the bachelor's degree and we provide the educational background required to enter graduate programs. Informal life-long learning can not be taught explicitly, but it can be emphasized and the requisite mind-set can be accomplished through example.

Professional conduct as an objective is accomplished by the program outcomes that address a need to understand the professional and ethical responsibilities incumbent upon the practicing electrical engineer, the role and impact of electrical engineering in a broader societal and global context, and the development of an understanding of contemporary technical and professional issues in the practice of electrical engineering.
CRITERION 4. CONTINUOUS IMPROVEMENT

The faculty of the Electrical Engineering Department under the leadership of the Chair has responsibility for implementing changes in the continuous improvement assessment plan upon recommendation from our significant constituencies comprised of:

- Students,
- Employers, and
- Alumni.

Any recommendations for improvement resulting from the assessment process are evaluated by the faculty for approval. One of our program strengths (and weaknesses!) is our small size. This means that we can react quickly to programmatic needs and rapidly fine tune our activities to best serve our constituency. Since we have the ability to move quickly, we must observe great care in not to tweak the program so often that it becomes unstable. We avoid this by careful analysis and impact review of all changes that we commit to. The figure below illustrates the process loop graphically. Note that this figure includes stakeholders as well as constituents in the assessment process.

A. Program Educational Objectives

Periodic evaluation of the objectives in order to meet the needs of the constituencies is accomplished by the following:

Advisory Board Meetings—our advisory board consists of alumni and non-alumni who are active in industry. The board meets twice yearly (fall and spring).

Faculty Meetings—we assess program objectives and outcomes twice yearly at the start of each long semester of the academic year (fall and spring).
College and University Planning—we participate in the strategic planning processes of both the university and college where we obtain insight into the directions that these entities are taking towards fulfillment or change of their mission statements.

Data collected for the evaluation of the program objectives:

Graduate Surveys – graduates are surveyed within a 3 to 5 year out span. These surveys are conducted by the faculty and then evaluated collectively. Results of these surveys are available in the department.

Advisory Board Opinions – this data is anecdotal and generated during twice yearly (fall and spring) meetings of the advisory board. The board is given a presentation on the state of the department and discussion ensues on any issues or concerns that are raised. Results of the meetings are transcribed to minutes and distributed to the members of the board, which include the faculty. This activity is an ongoing and continuous process. Copies of the minutes are available in the department.

B. Student Outcomes

The Program Outcomes are linked to our instructional curriculum and they mirror the ABET a-k outcomes. This linkage is loose for the non-program coursework that comprise the liberal arts core and our math and science requirements, hence the program outcomes are influenced indirectly by these courses due to inherent requirements; e.g., an ability to apply knowledge of the physical sciences and mathematics. We tightly couple the program outcomes in the courses that LUEE faculty teach and the matrix in Table 4.1 below illustrates this.
Table 4.1 LUEE Course Outcomes Matrix

<table>
<thead>
<tr>
<th>Course</th>
<th>ABET Criterion 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>ELEN1100 Introduction to Electrical Engineering</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN2411 Circuits I (w/lab)</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN3312 Circuits II</td>
<td></td>
</tr>
<tr>
<td>ELEN3313 Signals &amp; Systems</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN3421 Electronics I (w/lab)</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN3322 Electronics II</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN3431 Digital Logic Design (w/lab)</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN3381 Electrical Analysis</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN3441 Fundamentals of Power Engineering (w/lab)</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN4486 Microcomputers I (w/lab)</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN4387 Microcomputers II</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN3371 Electromagnetics</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN4351 Control Engineering</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN4101/4102 EE Seminar I/II</td>
<td>✗</td>
</tr>
<tr>
<td>ELEN4206/4207 Senior Projects Design I/II</td>
<td>✗</td>
</tr>
</tbody>
</table>

We used the ABET 3a-k outcomes as a template to produce EE specific wordings and then analyzed our instructional offerings to insure that we were meeting the outcomes through course-based assessment. Each of the Criteria 3 outcomes claimed in the table links to specific criteria in the course syllabi. An example of this is shown below, taken from the syllabus for ELEN2411 Circuits I.

**Objectives (with corresponding ABET Criteria/outcomes)**

Ensure students:

- Understand the basic concepts of Ohm's law and Kirchhoff's loop voltage and node current laws. (Criterion 3(a))
- Understand DC and AC circuit analysis for multiple sources, both independent and dependent sources. (Criterion 3(a))
- Know how to develop Thevenin and Norton equivalent circuits and use in varying load calculations and impedance matching. (Criterion 3(a),(e))
- Can understand and derive first-order differential equations describing circuit variables in transient analyses. (Criterion 3(a),(e))
- Can perform steady-state sinusoidal analysis of linear lumped-parameter circuits. (Criterion 3(a),(e))
As an example of the linkage, consider the first course objective "Understand the basic concepts of Ohm's law and Kirchhoff's loop voltage and node current laws." This objective links to Criterion 3a, our outcome that states that students will be able to apply knowledge of the physical sciences, mathematics, and engineering fundamentals to the solution of electrical engineering problems. Although Ohm's Law is typically introduced in HS physics and then later revisited in college physics, the application of it to electrical engineering problems, specifically those involving Kirchoff's loop voltage and node current laws, occurs in our course.

The metric goals for these course objectives are determined by the faculty in the form of homework assignments, quizzes and exams that validate the student achievement of the objective. The minimal level of achievement necessary to produce graduates that will ultimately achieve our Program Objectives following their graduation is set at a minimal score of 70%. We have sufficient overlap in the curriculum to insure program outcome coverage and the results of our Program Objective assessments have validated this. This minimal score is also consistent with the minimal passing level established by the National Council of Examiners for Engineering and Surveying (NCEES) for the fundamentals (FE) and principles and practice (PE) exams for electrical engineers to obtain professional registration. It is important, however, that we emphasize here that our outcomes assessment is not predicated on GPA, which is an aggregate average across all courses in the curriculum to include the liberal arts core.

Primary qualitative data to assess our program outcomes is determined from course evaluations. Prior to 2004 we used written forms passed out in class near the end of each semester. In 2004 the university ran a pilot program using the College of Engineering as a test case for on-line course evaluations and we have been utilizing that system since then. The company that we use, "Online Course Evaluations .com"†, sets up student access automatically through the registration database maintained by Lamar University. Approximately three weeks before the end of the semester, access is activated and students may go online through any web browser and input their response to the course surveys. The process is anonymous to the department and the faculty and approximately one week after commencement the results may be viewed. The questions served on the form are broad in nature and comments directed towards teaching effectiveness; however, the survey is a narrative design to encourage students to comment on the course content. Although the faculty collectively do not see the specific survey results, they do get a general summary compiled by the chair.

Commencement Questionnaires—graduating seniors are polled just prior to graduation each year. The survey requests information such as post graduation contact data, job interviews and offers and alternate contact points. With respect to program outcomes, the survey asks for an opinion of the student with respect to preparedness in terms of overall program outcomes. The survey then focuses on soft outcomes that include the following:

- the impact of engineering solutions in a global and societal context
- recognition of the need for, and an ability to engage in, life-long learning

† http://service.onlinecourseevaluations.com/index.aspx
knowledge of contemporary issues
preparation for OJT (On the Job Training)
preparedness training courses or in-house training seminars and workshops

The questionnaires also provide the department with job data as well as graduate school admissions. **These are key indicators of immediate program outcomes success.**

Each spring the capstone course of the program, ELEN4207 Senior Design, is evaluated by the entire faculty using a specially designed rubric. This rubric was developed in order to quantitatively assess the results of the EE instructional program for the Southern Association of Colleges and Schools (SACS) university level accreditation. The rubric yields quantitative assessment of the capstone effort of each student just prior to graduation. This data is then compiled and reviewed to allow for corrections to be made if necessary. The rubric was developed by the LUEE faculty with the assistance of the director of assessment for the university. The rubric used is posted online at:

http://ee.lamar.edu/EELABS/SeniorProjects/Project_Rubric.pdf

The results of the rubric assessments (since 2006) are available in the department.

**C. Continuous Improvement**

The LUEE program is robust and stable, however, in the last six years there have been a number of improvements made predicated on data collected in our assessment processes as well as direct input from our constituencies.

- Independent labs were merged into courses; i.e., courses with associated labs that were treated as independent courses from the labs were merged with their respective courses to convert from a three and one credit course set to a single four-credit course.

- More options were added to the senior design capstone to allow for greater flexibility in student project selection.

- The Infinity Project curriculum was replaced with the Paradigmatic Labs curriculum in the Introduction to Electrical Engineering course.

- Computer programming was dropped from the required curricula and established as a program entry pre-requisite.

Future program improvement plans based upon recent evaluations call for moving microcomputer programming courses earlier in the curriculum. The rationale for this is to prepare students more thoroughly for the senior design capstone and to give microcomputer background to rising seniors and thus facilitate their options for summer internships and co-op experiences.
D. Additional Information

Copies of all of the assessment materials referenced in this report (since 2006) are available for review at any time to authorized visitors to the department. This material includes exit questionnaires, surveys and minutes of LUEE advisory council meetings.
CRITERION 5. CURRICULUM

- Program Curriculum

Table 5-1 describes the plan of study for students in this program including information on course offerings in the required curriculum in the form of a recommended schedule by year and term along with maximum section enrollments for all courses in the program over the two years immediately preceding this visit. LUEE operates on a semester basis.

How the LUEE curriculum aligns with the program educational objectives:

As explained in Section 3-B, our Program Objectives encompass three major themes: professional preparation, life-long learning, and professional conduct. Professional preparation is addressed specifically by courses that address application, design and identification. We have what may best be described as a traditional program. Math and science make up the bulk of our non-engineering curriculum and we transition our students from those topics as viewed by the scientist to the view of the engineer. This is done with our foundational coursework that engages the student with circuits, electronics, signals and systems, electromagnetics and computers—fundamental paradigms of electrical engineering. The program also emphasizes communication skills, teamwork and an understanding of global issues facing today's electrical engineer. Our curriculum includes eight semesters of electrical engineering laboratory work, which is very extensive for contemporary EE programs, but the faculty and our constituencies consider a strong hands-on component essential for professional preparation. Labs exercise teaming and communications skills along with technical skills and learn-by-example paradigms are exercised in the student when they are working in the lab. The teaming aspect also evokes aspects of peer learning, a method that is recognized by pedagogic theorists and practitioners as a successful strategy for learning.

We identified two components to life-long learning earlier in this document, that of both formal and informal continuing education. Graduate programs and professional degrees are examples of formal programs of life-long learning that, in general, require the degree holder to stay current by virtue of their position—lawyers, physicians, researchers and faculty in higher-education. Since we encourage our students to study beyond the bachelor's degree, our curriculum provides them the educational background required to enter graduate programs, specifically the ability to attain acceptable scores on the GRE as well as other entrance qualifiers. Informal life-long learning cannot be taught explicitly, but it can be emphasized and the requisite mindset can be accomplished through example. We encourage informal life-long learning extensively in our ELEN4101/4102 EE Senior Seminar course.
Professional conduct as an objective is accomplished by required seminars that address a need to understand the professional and ethical responsibilities incumbent upon the practicing electrical engineer, the role and impact of electrical engineering in a broader societal and global context and the development of an understanding of contemporary technical and professional issues in the practice of electrical engineering.

How the LUEE curriculum and its prerequisite structure support the attainment of the student outcomes:

As previously discussed in Section 4-B, LUEE Program Outcomes are linked to our instructional curriculum by mirroring the ABET a-k outcomes. This linkage is loose for the non-program coursework that comprise the liberal arts core and our math and science requirements and it tightens as the student progresses through the curriculum to the senior year and our capstone ELEN4106/4107 Senior Design course. The program outcomes are influenced indirectly by the non-EE coursework due to inherent requirements; e.g., an ability to apply knowledge of the physical sciences and mathematics. We then tightly couple the program outcomes in the courses that our faculty teach and the matrix shown in Section 4-B illustrates this. We have a complimentary matrix for the non-EE coursework that is posted to our website. This matrix is predicated on course syllabi as the instructors for those courses are under no compulsion to be ABET outcomes specific. We do, however, rely on the fact that the university at large is accredited by the Southern Association of Colleges & Schools (SACS) that has adopted an assessment-oriented accreditation process similar to ABET although not as rigorous.
Chart illustrating prerequisite structure of the program’s required courses.

<table>
<thead>
<tr>
<th>Electrical Engineering Curriculum (BSEE)</th>
<th>124 Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FALL</strong></td>
<td><strong>SPRING</strong></td>
</tr>
<tr>
<td>FIRST YEAR</td>
<td></td>
</tr>
<tr>
<td>ELEN 1100 Introduction to Electrical Engineering</td>
<td>Communications / Modern Language</td>
</tr>
<tr>
<td>ENGL 1301 English Composition I</td>
<td>ENGL 1302 English Composition II</td>
</tr>
<tr>
<td>MATH 2413 Calculus &amp; Analytic Geometry I</td>
<td>MATH 2414 Calculus &amp; Analytic Geometry II</td>
</tr>
<tr>
<td>CHEM 1411 Chemistry I</td>
<td>PHYS 2425 Physics I</td>
</tr>
<tr>
<td>PHL 1370 Philosophy of Knowledge</td>
<td></td>
</tr>
<tr>
<td>PEGA Physical Education</td>
<td></td>
</tr>
<tr>
<td>SECOND YEAR</td>
<td></td>
</tr>
<tr>
<td>MATH 2415 Calculus &amp; Analytic Geometry II</td>
<td>MATH 3301 Ordinary Differential Equations</td>
</tr>
<tr>
<td>MATH 2318 Linear Algebra</td>
<td>PHYS 3350 Modern Physics</td>
</tr>
<tr>
<td>PHYS 2426 Physics II</td>
<td>ELEN 2411 Circuits I (w/lab)</td>
</tr>
<tr>
<td>MATH 3370 Intro to Theory of Statistical Inference</td>
<td>History Elective</td>
</tr>
<tr>
<td>INEN 2373 Engineering Economics (or equivalent)</td>
<td></td>
</tr>
<tr>
<td>THIRD YEAR</td>
<td></td>
</tr>
<tr>
<td>ELEN 3312 Circuits II</td>
<td>ELEN 3313 Signals &amp; Systems</td>
</tr>
<tr>
<td>ELEN 3421 Electronics I (with lab)</td>
<td>ELEN 3322 Electronics II</td>
</tr>
<tr>
<td>ELEN 3371 Electromagnetics</td>
<td>ELEN 3381 Electrical Analysis</td>
</tr>
<tr>
<td>ELEN 3431 Digital Logic Design (with lab)</td>
<td>ELEN 3441 Fund of Power Engineering (with lab)</td>
</tr>
<tr>
<td>English Literature Elective</td>
<td>History Elective</td>
</tr>
<tr>
<td>FOURTH YEAR</td>
<td></td>
</tr>
<tr>
<td>ELEN 4101 Seminar I</td>
<td>ELEN 4102 Seminar II</td>
</tr>
<tr>
<td>ELEN 4206 Senior Projects Design I</td>
<td>ELEN 4207 Senior Projects Design II</td>
</tr>
<tr>
<td>ELEN 4486 Microcomputers I &amp; Lab</td>
<td>ELEN 4387 Microcomputers II</td>
</tr>
<tr>
<td>ELEN 4351 Control Engineering</td>
<td>ELEN Elective</td>
</tr>
<tr>
<td>ELEN Elective</td>
<td>Fine Arts Elective</td>
</tr>
<tr>
<td>POLS 2301 American Government I</td>
<td>POLS 2302 American Government II</td>
</tr>
</tbody>
</table>

The chart above shows courses in various colors to delineate how they are taken. Firstly, course numbering is restrictive as to the level at which they are taken; e.g., 4XXX is senior level while 1XXX is freshman. Courses must be taken in sequence along with class level. Colors show critical discipline with black being used for general studies. General studies courses may be taken at any time with the caveat that they be taken in sequence if sequential; i.e., POLS2302 after POLS2301, and at the correct class level or higher. Courses in green are mathematics, blue science and red EE.

How the LUEE program meets the requirements in terms of hours and depth of study for each subject area (Math & Basic Sciences, Engineering Topics, and General Education) specifically addressed by either the general criteria or the program criteria:

Table 5-1 below tallies course credits in the ABET criteria required subject areas. We exceed by 4% the required minimums in math and science and by 1.2% the engineering topics. General Education has no ABET minimum; however, we conform to the Texas General Studies Core as imposed by state statutes.

Describe the major design experience that prepares students for engineering practice and describe how this experience is based upon the knowledge and skills acquired in earlier coursework and incorporates appropriate engineering standards and multiple design constraints.

The major design experience is accomplished over two semesters when students take the ELEN4106/4107 Senior Design courses. The design experience is supplemented and complimented by the seminar course, ELEN4101/4102, that is taken
concurrently. In the Senior Design sequence, students form teams and select projects that will be developed over the fall and spring semesters. The projects must follow what we call the EE Content Rule, which states that projects must be such that the major design and functionality is such that an electrical engineer would do. For example, if a team wanted to construct a distillation column for petrochemicals, it would not be approved. However, if they wished to design a controller for same and then construct and install it, then we would approve and encourage given the interdisciplinary aspect of such a project. The EE Content Rule ensures that the project will exercise the knowledge and skills acquired in the program.

Appropriate engineering standards are enforced in the project management development aspects of the course. Students are lectured in the preparation of project goals, objectives and scope, a project network diagram and Gantt chart, and resource and risk analyses. These project elements are displayed, as a work in progress that culminates at the end of the spring semester, on a project board which is evaluated by the faculty using the Project Poster Board Assessment Rubric. This rubric not only validates the program outcomes, but also is used for SACS assessments.

Incorporation of multiple design constraints is encountered during the development of project scope and resource analysis. A lecture on engineering standards is also included during the course to make students aware of how standards are developed, what agencies monitor and maintain standards and how standards are incorporated into project designs.

Materials that will be available for review during the visit to demonstrate achievement related to this criterion.

The visitors will be afforded a private office space set aside for their convenience so that they can review materials in support of this self-study report. These materials are as follows:

- LUEE Course textbooks and printed course supplements
- LUEE Course Portfolios (folders with student sample work, program outcomes marked)
- LUEE Senior Questionnaires (Notebook)
- LUEE Advisory Board Minutes (Notebook)
- LUEE Alumni Program Objectives Survey (Notebook)
- ELEN4106/4107 Senior Design Evaluation Rubric (Notebook)
- LUEE Faculty CV’s (Notebook)
- Course Syllabi (Notebook)
- LUEE Self-Study Report (Notebook containing hardcopy of this document)
- Senior Design Project Assessment Rubrics

Computer with access to:
- LUEE ABET Materials webpages and Lamar University SACS webpages
<table>
<thead>
<tr>
<th>Course</th>
<th>Subject Area (Credit Hours)</th>
<th>Engineering Topics</th>
<th>Math &amp; Basic Sciences</th>
<th>General Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1301 Composition I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 2413 Calculus and Analytical Geometry I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEN 1100 Introduction to Electrical Engineer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 1411 Chemistry I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHIL 1370 Philosophy of Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 1302/1374 Composition II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 2414 Calculus and Analytical Geometry II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 2425 University Physics I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Language/Communication Elective: COMM 1315, 1360, 2335, 3310, or 3340 or introductory modern language course including DSDE 1371</td>
<td>SE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEGA Physical Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 2415/3435 Calculus and Analytical Geometry III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 3328 Linear Algebra</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 2426 University Physics II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 3370 Intro to Theory of Statistical Inference</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Elective: ECON 1301, PSYC 2301, ANTH 2346 or 2351, SOCI 1301 (both ECON 2301 &amp; ECON 2302) or INEN 2373</td>
<td>SE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL English Literature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First Year, First Semester – 15 Hours

Second Year, First Semester – 17 Hours

Second Year, Second Semester – 13 Hours

Third Year, First Semester – 17 Hours
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Semester</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEN 3313 Signals and Systems</td>
<td>3</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN 3322 Electronics II</td>
<td>3</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN 3441 Fundamentals of Power Engineering</td>
<td>4</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>History Elective II: HIST 1301, 1302, 2372, 2374, 1361, 1362, 2377 or 2301</td>
<td>3</td>
<td>SE</td>
<td></td>
</tr>
<tr>
<td>ELEN 3322 Electronics II</td>
<td>3</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN 4101 Electrical Engineering Seminar I</td>
<td>3</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>ELEN 4206 Senior Projects Design I</td>
<td>2</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN 4351 Control Engineering</td>
<td>3</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN 4486 Microprocessors I</td>
<td>4</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN Elective I: Math and Science courses may be substituted if approved by the department chair</td>
<td>3</td>
<td>SE</td>
<td></td>
</tr>
<tr>
<td>POLS 2301 American Government I</td>
<td>3</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>ELEN 4102 Electrical Engineering Seminar II</td>
<td>3</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>ELEN 4207 Senior Projects Design II</td>
<td>2</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN 4387 Microprocessors II</td>
<td>3</td>
<td>R</td>
<td>(√)</td>
</tr>
<tr>
<td>ELEN Elective II</td>
<td>3</td>
<td>SE</td>
<td></td>
</tr>
<tr>
<td>POLS 2302 American Government II</td>
<td>3</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Fine Arts Elective: ARTS 1301, DANC 2304, HUMA 1315, MUSI 1306, THEA 1310 or COMM 1375</td>
<td>3</td>
<td>SE</td>
<td></td>
</tr>
</tbody>
</table>

*Add rows as needed to show all courses in the curriculum.*

**TOTALS-ABET BASIC-LEVEL REQUIREMENTS**

<table>
<thead>
<tr>
<th>OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM</th>
<th>124</th>
<th>36</th>
<th>54</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENT OF TOTAL</td>
<td>29%</td>
<td>38.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Semester Credit Hours</td>
<td>32 Hours</td>
<td>48 Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Percentage</td>
<td>25%</td>
<td>37.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CRITERION 6. FACULTY

A. Faculty Qualifications

The Department of Electrical Engineering has six full-time faculty members to include the department chair. In addition, one of those faculty is an endowed Chair. We also have a joint appointment faculty member from Physics and a part-time instructor. Since our last visit, we have two full professors, three associate professors, one assistant professor and an instructor (not including the joint appointment). Many faculty members participate in professional activities such as presenting talks in local, national and international conferences, serving as chairs of sessions for such conferences, and serving as the members of the editorial boards for professional publications as well as holding leadership positions in the IEEE. Some of the faculty members are also involved in consulting and writing books.

Two new faculty have joined the department since 2006, they are:

2008 Gleb Tcheslavski, Ph.D., P.E. Assistant Professor
2007 Koji Hirano, MSEE, Instructor

The faculty is the heart of our program and consists of six full-time professors all with Ph.D. degrees in electrical engineering. Please consult Table 6-1 for specific data. The faculty is well-distributed in expertise to cover the foundational areas of our program and we include overlap between the undergraduate and graduate coursework to provide advanced coursework for seniors as part of their elective course choices. The basic curricular areas of the program have previously been listed, which we call the paradigmatic areas, but we revisit them here: circuits, electronics, signals and systems, electromagnetics and computers. Faculty coverage of them is shown in Figure 6-2.

The state required teaching load in the EE Department is twelve load units per semester. In addition to teaching in the classroom, most faculty members supervise graduate and undergraduate students in such courses as individual studies, research, thesis and dissertation, and seminar. Teaching load varies from two to four classroom lecture courses per semester depending on activity in research and graduate supervision.

New faculty members lighter teaching assignments to give them time to establish their research programs and adapt themselves to the department. Faculty have the option to buy-out from a course during each semester to a minimum of one course. In the last five years we have used about three adjunct professors to cover all our courses. New faculty are given start-up funds, space for their laboratory, and reduced teaching loads. They are also given preference for summer support.

Faculty performance evaluation is conducted every calendar year. The evaluation is a critical element in the assessment of the success of the program in meeting its educational objectives and in the determination of future objectives. The primary purpose of faculty evaluation is to assess contributions of faculty members to the program, and more broadly, to the mission of
the college and university. The process is vitally important for tenure-track faculty. The performance evaluation constitutes one consideration in the determination of salary increases should they be authorized, but other factors such as alleviating salary compression and relative inequity and departmental effectiveness, may also contribute to the determination of merit increases.

**Figure 6-1. EE Faculty topic/course coverage diagram.**

The program has between forty to fifty students in the upper division at any time and this is where EE faculty begin primary interaction with them. In the lower division, faculty have an initial encounter in the engineering introductory course (ELEN1100) and in ELEN2411 Circuits I. This interaction is minimal since this is only three courses across four semesters. In both introductory courses, however, students are encouraged to attend and join the student section of the IEEE and participate in other department activities. Each faculty member makes themselves available to students as needed. At the end of each semester, the university conducts student evaluations for every course using a 3rd-party online system. The evaluations play a major role in determining salary increases and promotions.

After students get to the upper division, they begin to interact with the faculty more frequently and for the rest of their time at the university. It is during this stage that the students establish very strong rapport with the faculty. Formal advising is done by the entire faculty and is easily accommodated due to the small number of students.
The faculty are active in the IEEE and involve students in the society activities as much as possible. The Beaumont Section allows the student section chair to sit as a non-voting member of the executive committee. The program also has an active chapter of Eta Kappa Nu (Delta Beta) that the faculty participate in. These interactions serve to enhance the professional awareness of the students and to enforce team-bonds outside of normal classroom and school day activities. This sort of bonding carries over into the professional lives of our students after graduation and many alumni maintain contact with us regularly for this reason. This also establishes contact with industry for our faculty and is an important element of our program assessment in terms of our employer survey process.

Two of our six faculty members are registered professional engineers: one in Texas and one in Texas and Florida. This establishes a diversity of background in that each state has different procedures and statutes for the maintenance of registration.

Collectively, the EE faculty have over 100 years of experience teaching engineering with forty-five years of government or industry practice to enhance it. The research backgrounds are sufficiently diverse to allow a good distribution of specialties without overtaxing any individual. The nature of our graduate program is such that we can allow for a significant overlap into upper division electives so that the undergraduate program is enhanced while avoiding teaching overload in the areas served by dual-listed courses (graduate courses at the master's level that may be taken by senior undergraduates). The level of scholarship by the faculty is exceptional given our size. The table below shows scholarly/funding productivity since the last ABET visit.

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refereed journal papers</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Conference papers</td>
<td>11</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Books</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Patents</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>††</td>
</tr>
<tr>
<td>Research funding</td>
<td>$235K</td>
<td>$15K</td>
<td>$5K</td>
<td>$59K</td>
<td>$5K</td>
<td>$5K</td>
</tr>
<tr>
<td>Corporate/private donations</td>
<td>$5M</td>
<td>$8.5K</td>
<td>$1.5K</td>
<td>$2K</td>
<td>$2K</td>
<td>0</td>
</tr>
</tbody>
</table>

**B. Faculty Workload**

Reference Table 6-2 (below), Faculty Workload Summary. Workload expectations of the faculty are as described earlier, 12 load units per semester. The calculations of these units is dependent on course type (lecture, lab, seminar, etc.), number of students, credit hours earned and level (ugrad, MS or doctoral). A faculty member teaching two courses in a semester while supervising three master's candidates and one doctoral can easily equal the same load units as a faculty member teaching four lectures. Faculty workloads are distributed to account for curriculum requirements, faculty research and rank.

†† Patent application filed (USPTO 12/958,197)

† Naming of department by Philip M. Drayer, estate gift, $250K endowed in 2007.
C. Faculty Size

As discussed above, the faculty size is adequate for coverage of the program, however, research output (and expectation) is minimal. The extent and quality of faculty involvement in interactions with students is extensive due to our small enrollment. By graduation all of the faculty know the graduating class quite well, to the extent that they can recognize them by name. Student advising and counseling profits from this as students feel comfortable in confiding in faculty as well as being mentored on career decisions. University service activities are distributed equally across college departments, which vary in size, and so there is no undue service burden placed on LUEE faculty. Professional development is restricted because of recent budget cuts, but all faculty have the opportunity to travel at least once per year.

Faculty are members of the Department Advisory Board, which has no formal structure, and interact with advisory board members twice yearly. many of the board members are alumni and employers of alumni. Faculty also interact with local industry and arrange site visits for classes to local engineering facilities. The majority of the engineers in the region are LU graduates, and so a close and regular contact is maintained between faculty and professional practitioners. The college has established various industrial interactive venues to include the twice yearly "Breakfast of Champions" for local industrial plant managers as well as twice-yearly All College of Engineering lectures that faculty have access to.

D. Professional Development

Lamar University has a strong commitment to student and faculty engagement and teaching and learning excellence. Under the direction of the Provost’s Office, the Center for Teaching and Learning Enhancement supports faculty, administrators, graduate students, and staff in their academic pursuits and provides a range of instructional services to assist all members of the LU teaching community. In order to foster and sustain a culture that practices, values, and rewards teaching and learning as vital forms of scholarship at Lamar University, the Center for Teaching and Learning Enhancement takes as its mission to:

• Promote deep understanding of the scholarship of teaching and learning by assisting both individuals and groups of instructors to gather, analyze, and reflect on information about their own teaching and their students' learning.

• Cultivate dialogue about teaching pedagogies and learning theories through seminars, orientations, workshops, teaching and learning circles, and other programming.

• Foster the use of research-based best practices, models, and approaches to university teaching and learning -- and facilitate access to resources that support them.

Because our focus at Lamar University is both on student learning and creating an environment that stimulates the development of excellent teaching, our approach is multifaceted. We realize that teaching is a means to an end and that our graduates need to be
prepared for real-world challenges. Assistance is offered through the following faculty development programming: workshops and seminars, faculty learning communities, evaluation and assessment, ACES Fellows program, and podcasts.

E. Authority and Responsibility of Faculty

The role played by the LUEE faculty with respect to program guidance is that they constitute the main interactive element of the program in terms of academics since they are responsible for the instruction as it relates to our discipline. We rely heavily on the fact that the faculty are well-qualified in their respective EE subdisciplines and have extensive experience, both academic and industrial, to be able to deliver course materials in an acceptable and efficient manner.

The faculty are essential to the development and implementation of the processes for the evaluation, assessment, and continuing improvement of the program since any perturbations that occur in the instructional process will reverberate through the program and will have an immediate effect on outcomes that will ultimately affect objectives. For this reason, the faculty are tasked individually with the evaluation, assessment and continuing improvement of the program outcomes. They do this via a continual activity of monitoring the outcomes as they apply to their course offerings, adjusting as necessary to insure coverage, and then performing layered assessment of those outcomes through coursework.

The program objectives, which one can reasonably argue are associated with student activity after they are no longer students (in the program), are evaluated and assessed directly by the faculty through our graduate surveys. Prior to the graduate survey, the employer surveys were conducted by the faculty. These activities give immediate, collegial feedback that can then be applied to continuous improvement. The faculty work closely with the department advisory board, which performs a validation and grounding function.

External roles, such as those of the dean and provost, are predicated on academic leadership. It is important that the dean be cognizant of university funding and administration mechanisms as they relate to the mission of the program. The dean then must interact effectively with the provost to insure that adequate resources are available for program functions to be maintained, which include robust continuous improvement. The LUEE program has confidence in the administration at Lamar University.
### Table 6-1. Faculty Qualifications
Bachelor of Science in Electrical Engineering

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Highest Degree Earned-Field and Year</th>
<th>Rank</th>
<th>Type of Academic Appointment</th>
<th>Years of Experience</th>
<th>Professional Registration/Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myler, Harley R.</td>
<td>PHD-EE-1985</td>
<td>P</td>
<td>T, FT</td>
<td>31</td>
<td>10 PE (T)</td>
</tr>
<tr>
<td>Bean, Wendell C.</td>
<td>PHD-EE-1961</td>
<td>P</td>
<td>T, FT</td>
<td>16</td>
<td>44 PE (T)</td>
</tr>
<tr>
<td>Reddy, G. N.</td>
<td>PHD-EE-1982</td>
<td>ASC</td>
<td>T, FT</td>
<td>31</td>
<td>22</td>
</tr>
<tr>
<td>Sayil, Selahattin</td>
<td>PHD-EE-2000</td>
<td>ASC</td>
<td>T, FT</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Wang, Ruhai</td>
<td>PHD-EE-2001</td>
<td>ASC</td>
<td>T, FT</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Tcheslavski, Gleb V.</td>
<td>PHD-EE-2005</td>
<td>AST</td>
<td>TT, FT</td>
<td>2</td>
<td>4.5</td>
</tr>
<tr>
<td>Hirano, Koji</td>
<td>MSEE-1996</td>
<td>I</td>
<td>NTT, PT</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

### Table 6-2. Faculty Workload Summary
Bachelor of Science in Electrical Engineering

<table>
<thead>
<tr>
<th>Faculty Member (name)</th>
<th>PT or FT¹</th>
<th>Classes Taught (Course No./Credit Hrs.) Term and Year²</th>
<th>Program Activity Distribution³</th>
<th>% of Time Devoted to the Program⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Teaching</td>
<td>Research or Scholarship</td>
</tr>
</tbody>
</table>

---

¹ PT: Part-time, FT: Full-time
² Course No./Credit Hrs.
³ Teaching, Research or Scholarship, Other
⁴ Percentage of time spent on teaching, research, or other activities.
⁵ Total percentage of time devoted to the program activities.
<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Courses and Terms</th>
<th>45%</th>
<th>5%</th>
<th>50%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Status</td>
<td>Courses</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------</td>
<td>-------------------------------------------------------------------------</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hirano, Koji</td>
<td>PT</td>
<td>ELEN 1100/1/F2011</td>
<td>ELEN 1301/3/F2011</td>
<td>ELEN 1100/1/S2012</td>
<td>ELEN 1301/3/S2012</td>
<td>50%</td>
</tr>
</tbody>
</table>

1. Out of the total time employed at the institution.
CRITERION 7. FACILITIES

A. Offices, Classrooms and Laboratories

Offices

The administrative and faculty offices of LUEE are all located in the Cherry Engineering building on the Lamar University main campus. The department administrative associate has a workstation/reception counter in the lobby of what is called the "Dean's Suite". This space is shared with the Mechanical, Civil, and Industrial Engineering Departments while Chemical Engineering enjoys a private space in a separate building. The office of the department chair is located behind the workstation/reception counter of the administrative associate. These office spaces are equipped with telephones and administrative computers.

The faculty have individual offices in various locations in the building, however, they are predominantly clustered in close proximity to the department area described above. Graduate students share offices and in some instances have desk space in laboratories. All graduate students who are assigned office space are given a desktop computer with Internet access. Doctoral students are given private offices as space permits to include telephones.

LUEE office space is adequate to the task of supporting the department mission and program objectives.

Classrooms and Equipment

LUEE has one large classroom (Cherry 2631) available to it exclusively that seats 70 students and a smaller classroom (Cherry 1606) seating 30 students that is shared with Industrial Engineering. Both of these classrooms are equipped with Internet connected computers and projectors as well as white boards. Cherry 1606 also has a SMART Board interactive whiteboard. Cherry 1006, a stadium-style computer teaching lab is also available as needed. LUEE also has Cherry 1103, the EE Library/Seminar room, available for classes although it is not formally scheduled for such. 1103 has a projector system and Internet access.

LUEE classroom space and access is adequate to the task of supporting the department mission and program objectives.

Laboratories

Table 7-1 lists all of the LUEE laboratories and the courses or activities they support. All labs are access controlled with electronic locks and students may be given various degrees of access via codes maintained by the department Lab Manager. All of the labs are located in the Cherry Engineering building, room numbers shown as CXXXX. The hours listed are those hours when students may access the labs. The table in Appendix C lists the equipment available in the labs. The primary EE course sequence in the LUEE undergraduate program
is supported using National Instruments Electronic Laboratory Virtual Instrument Systems (ELVIS). This would include Intro to EE, Circuits, Electronics, Digital Design, Microcomputers and Senior Design labs. Students entering the program and taking ELEN1101 Introduction to Electrical Engineering purchase a "LUEE ELVIS" prototyping board (see Figure 7-1 below) and parts kit. This board was designed specifically for our program and is used by an LUEE student throughout their time in the program. The only exception to this is in the microcomputer lab, where an Agilent ELVIS board is used, and in the power lab, where LabVolt stations are used. The ELVIS system is programmed in LabVIEW and LUEE students are given an early introduction to its use and continue to use it throughout the program.

![LUEE ELVIS Board](image)

Figure 7-1. LUEE ELVIS Board

LabVIEW, MATLAB and MultiSim are installed on all undergraduate laboratory computers. As mentioned above, LabVIEW is used for laboratory and general simulation work. MATLAB is taught in ELEN3381 Electrical Analysis and then is used in the lab for ELEN3441 Fundamentals of Power when students prepare lab reports on their lab findings. MATLAB also features in homework assignments for various courses in the program and most of the textbooks we use are "with MATLAB". MultiSim is used for all of our electronics courses and students in ELEN4206/4207 Senior Design have access to UltiBoard schematic capture software and our T-Tech PC Board Mill, located in the prototyping facility.
B. Computing Resources

The University offers authenticated direct access to campus network services for devices on the Lamar network; VPN connectivity to campus network services for off campus access; and wireless access on campus for students and faculty. Third party hosted services such as email (Zimbra) and the online learning management system (Blackboard) are available to students 24/7, exclusive of scheduled maintenance. All computer systems are connected to the University’s fiber optic backbone using gigabit Ethernet. Electronic services delivered by the Information Technology Division are available to students and faculty Monday through Sunday.
with the exception of Thursday evenings between the hours of 8:30PM through 12:30 AM which is the standard IT maintenance window (the services affected will vary). Students and faculty have access to campus network services 24 hours a day, seven days a week while on campus or from off campus.

The University Library houses 2 open labs in the Library available to students Monday through Thursday 8 am to 11:30 pm Friday 8 am to 5:30 pm, Saturday 10 am to 7 pm and Sunday 2 pm to 12 am. There are 120 computers available in these two areas. Lamar University issues unique email addresses and computer logins to all enrolled students at the University.

The College of Engineering (COE) has two open computer labs for our undergraduate and graduate students. The C2000 lab is open 6 days per week. The hours of operation are 8:00 am to 10:00 pm on weekdays and 12:00 pm to 6:00 pm on Saturday. The lab has 16 Dell® Precision 490® Workstations that are equipped with Intel Xeon processors with 4 GB of memory RAM and NVIDIA GeForce 9500 GT graphics card having 1 GB of dedicated graphical memory. The C1000 lab functions as both a lab for students and a classroom. The lab has 29 Dell® Precision WorkStation T5400®, 16 Dell® Precision 490®, and 6 Dell OptiPlex GX 280. The 29 Dell® Precision WorkStation T5400® are typically equipped with Intel Xeon processors with 4 GB of memory RAM and NVIDIA GeForce 9500 GT graphics card having 1 GB of dedicated graphical memory. This lab has stadium style seating so that all students have a good view of the board and projector screen.

The standard software installed on all COE Lab Computers is:

1. PROe
2. MD Nastran 2010
3. ARCHICAD 14
4. MathCad 14.0
5. Microsoft Visual Studio 2010 Professional
6. MATLAB
7. Microsoft Office Professional 2010
8. Microsoft VISIO Premium 2010
9. SAP GUI7.10
10. IBM SPSS Statistics 19
11. Rockwell Automation ARENA 13.5
12. R
13. IBM CPLEX

LUEE maintains a lab (Cherry 1306) with computers loaded with design software that is available to any LUEE student via access code 24/7. Most building on the University campus have public wireless internet access.
C. Guidance

Prior to the start of any laboratory course in the program each semester, a safety briefing is given by the department lab manager for equipment and apparatus that will be used during the conduct of the lab. Also reviewed are emergency procedures and the location of emergency support equipment.

All undergraduate laboratory exercises are supervised by faculty, technical staff and/or teaching assistants knowledgeable about the use of the relevant equipment or computing resources. Students are encouraged to operate laboratory equipment for themselves after instruction is given on operation. Most laboratory exercises begin with demonstration/training in the use of any equipment or instrumentation by faculty or teaching assistants.

Training in the use of computer software occurs as part of basic instruction in several classes with follow-up in-laboratory work. This training is supervised by faculty and teaching assistants of those courses.

D. Maintenance and Upgrading of Facilities

Upgrade of the lab equipment are done annually according to the availability of funds and the operating condition of the existing machine tools. In total, the department has spent over $132,496.03 during the last 6 years on equipment and facility improvements with most of this money being directed at teaching equipment and lab spaces. During the last two years, two advanced, high-frequency analyzers were purchased with capital funds (HEAF). At the end of the semester, the lab manager performs a thorough inventory, review and maintenance on all LUEE lab equipment.

E. Library Services

The Lamar University Library is located next to the Cherry Engineering Building. The seating capacity of the library is 860. There are 220 study tables, 139 carrels, 17 group study rooms, two PC labs (all included in the 860 seat count), and a small auditorium that seats 48 individuals. The library has over 419,932 books and 129,931 periodicals and significant online resources(Table 7-2).
Table 7-2. LIBRARY ACQUISITIONS & RESOURCES.

<table>
<thead>
<tr>
<th>Acquisitions &amp; Resources</th>
<th>Acquisitions during the last three (3) years</th>
<th>Current Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Print Books</td>
<td>Print Periodicals</td>
</tr>
<tr>
<td>Entire Institution Library</td>
<td>8,359</td>
<td>1,701</td>
</tr>
<tr>
<td>In the following fields (included above)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>704</td>
<td>260</td>
</tr>
<tr>
<td>Chemistry</td>
<td>463</td>
<td>48</td>
</tr>
<tr>
<td>Mathematics</td>
<td>463</td>
<td>46</td>
</tr>
<tr>
<td>Physics</td>
<td>85</td>
<td>90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>E-books</th>
<th>E-journals</th>
<th>E-books</th>
<th>E-journals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire Institution Library</td>
<td>75,688</td>
<td></td>
<td>103,968</td>
<td>37,555</td>
</tr>
<tr>
<td>Engineering</td>
<td>6,664</td>
<td></td>
<td>6,649</td>
<td>158</td>
</tr>
<tr>
<td>Chemistry</td>
<td>568</td>
<td></td>
<td>693</td>
<td>130</td>
</tr>
<tr>
<td>Mathematics</td>
<td>1,168</td>
<td></td>
<td>1,453</td>
<td>75</td>
</tr>
<tr>
<td>Physics</td>
<td>1,313</td>
<td></td>
<td>1,520</td>
<td>98</td>
</tr>
</tbody>
</table>

The library expenditures for the past three years and the amounts allotted for library services in the field of engineering are shown in Table 7-3.

Table 7-3. Library engineering expenditures.

<table>
<thead>
<tr>
<th>Library Expenditures</th>
<th>2007-08</th>
<th>2008-09</th>
<th>2009-10</th>
<th>2010-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Library Materials</td>
<td>$1,533,440.44</td>
<td>$1,571,222.40</td>
<td>$1,720,586.52</td>
<td>$1,794,981.69</td>
</tr>
<tr>
<td>Print Expenditures for the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Unit (Total)</td>
<td>$165,080.63</td>
<td>$177,463.03</td>
<td>$176,114.55</td>
<td>$194,303.91</td>
</tr>
<tr>
<td>Print Books</td>
<td>$12,918.94</td>
<td>$10,831.80</td>
<td>$10,910.44</td>
<td>$11,084.99</td>
</tr>
<tr>
<td>Print Periodicals</td>
<td>$167,153.91</td>
<td>$98,459.12</td>
<td>$92,610.24</td>
<td>$93,507.81</td>
</tr>
<tr>
<td>Other Engineering-Related</td>
<td>$215,507.75</td>
<td>$233,738.03</td>
<td>$194,735.34*</td>
<td>$196,705.18</td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Mary & John Gray Library also subscribes to a number of electronic (web-based) research databases in support of Engineering and related disciplines. They are listed below with the respective costs for 2011 in Table 7-4. The library also has the IEEE Xplore All-Society Periodicals Package (ASPP) to support the LUEE program.

The librarian who serves as the liaison to the College of Engineering coordinates book selection for each of the engineering departments. Each department has a library representative who assists in gathering and prioritizing requests. Before canceling journal subscriptions, the librarians conduct a careful evaluation in cooperation with the designated LUEE representative. Librarians routinely check “core” lists and special bibliographies to ensure that limited resources are used as effectively as possible.
Table 7-4. Key engineering databases and costs.

<table>
<thead>
<tr>
<th>Database</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE Xplore All-Society Periodicals Package</td>
<td>$40,370.00</td>
</tr>
<tr>
<td>IEEE Computer Science Digital Library</td>
<td>8,519.00</td>
</tr>
<tr>
<td>EI Engineering Village</td>
<td>20,808.00</td>
</tr>
<tr>
<td>CRC EngNetBase</td>
<td>6,955.00</td>
</tr>
<tr>
<td>Knovel</td>
<td>9,962.00</td>
</tr>
<tr>
<td>ScienceDirect (multi-disciplinary)</td>
<td>334,809.11</td>
</tr>
<tr>
<td>Science Citation Index</td>
<td>27,357.00</td>
</tr>
<tr>
<td>Kirk-Othmer Encyclopedia of Chemical Technology†</td>
<td>2,593.36</td>
</tr>
<tr>
<td>Encyclopedia of Polymer Science &amp; Technology†</td>
<td>1,001.52</td>
</tr>
<tr>
<td>MathSciNet</td>
<td>2,288.00</td>
</tr>
<tr>
<td>ACS Web Editions</td>
<td>41,129.00</td>
</tr>
<tr>
<td>ACS Legacy Archives</td>
<td>16,933.00</td>
</tr>
<tr>
<td>ACM Digital Library</td>
<td>4,800.00</td>
</tr>
<tr>
<td>ASCE Library Online</td>
<td>12,577.00</td>
</tr>
<tr>
<td>SciFinder</td>
<td>15,450.00</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>$537,077.99</strong></td>
</tr>
</tbody>
</table>

†These databases are funded with a grant from ExxonMobil.

The Library’s combined expenditure for all database subscriptions in 2011 was $909,291.62. In recent years, the Library has concentrated more on Web-based resources, which offer more efficient search capabilities, as well as remote access. It is difficult to account specifically on the expenditures for e-books in support of Engineering and related fields, since our e-books are largely purchased in multi-disciplinary sets. However, the library did purchase specific e-book subject sets in engineering in 2010, including $11,830 from Springer and $13,955 from Elsevier. These expenditures are in addition to the print and electronic expenditures reported above.

Location and Arrangement of the Engineering Collections

All engineering materials housed in the Gray Library are classified and arranged by the Library of Congress classification system. The Library has an integrated online computer system, SIRSI/Dynix, which provides access to all print materials and specific segments of electronic resources available in the collection. All electronic resources are available via secure log-in through the databases section of the library webpage (http://library.lamar.edu). The building is centrally located on campus with reference materials and a reference computer lab on the first floor, and current journals and government documents on the second floor. Floors 3-5 are stack floors, and a media services unit, a hands-on classroom, and a computer lab are located on the 7th floor.

Engineering materials include monographs, journals, state and federal documents, and collections of codes, standards, and annual reports of corporations.

Reference services available to students and faculty

There are four reference librarians and one documents/reference librarian who provide reference service. The reference desk is staffed at all hours when the library is open—a total of 95.5 hours each week. A paraprofessional also assists with the provision of
The interlibrary loans unit provides rapid access to resources available in other libraries. A specialized student assistant also assists those with hearing disabilities.

**Databases Available to Students and Faculty**

The Library subscribes to several electronic resources to facilitate the research of the undergraduates, graduates, and faculty of the College of Engineering. The following databases reference or provide full text for information sources pertinent to chemistry, engineering, mathematics, or physics:

- **ACS (American Chemical Society) Web Editions**: complete full text content for the most recent five years’ worth of issues from thirty-six journals
- **Encyclopedia of Polymer Science and Technology**: a full text reference source
- **Engineering Village 2 (Compendex)**: indexes (with some full text) the content of over 5,000 journal, trade, and conference publications
- **IEEE Xplore®**: indexes the content of most publications of the IEEE including journals, transactions, letters, magazines, conference proceedings, and standards. LUEE faculty and students have access (via network password) to the All-Society Periodicals Package (ASSP) which includes the following:
  - Over 148 IEEE online society-sponsored journals, transactions and magazines;
  - Full-text PDFs of 188,000+ articles;
  - Nearly three million abstract records from over 1.6 million authors;
  - Backfile to 2005;
  - INSPEC® abstract/citation and bibliographic records;
  - Online access to articles accepted for future print publication.
- **Kirk-Othmer Encyclopedia of Chemical Technology**: a full-text online reference book
- **Knovel Library (Life Sciences & Chemistry Collection)**: provides the full text of over 790 titles, including books, codes, conference papers and proceedings, databases/tables, dictionaries, encyclopedias, guidelines, handbooks, and manuals; also indexes the content
- **Mathematical Reviews (MathSciNet)**: indexes over 1,700 journals, magazines, books
- **Science Citation Index Expanded**: indexes over 5,900 journals
- **ScienceDirect**: indexes (with over 400 titles available full-text) over 2,000 journals, plus numerous reference books, handbooks, and book series.

Furthermore, while not entirely dedicated to the sciences, the following databases contain some content significant to engineering research:
• Academic Search Premier
• ProQuest Dissertations & Theses, Full Text
• JSTOR (Arts and Sciences Collection I)
• ProQuest Research Library

Students and faculty may access all of the electronic resources listed above from computers either on or off campus via the Library’s web site. Students and faculty may receive assistance using these resources from the librarians in the Reference Area on the first floor of the Gray Library. Materials not available in a full-text format online are usually available in the Library’s physical collection or from another library via our Interlibrary Loan service.

Hours of Operation
Library facilities are available to users 95.5 hours per week:

- Monday – Thursday: 7:30 a.m. – 12:00 p.m.
- Friday: 7:30 a.m. – 6:00 p.m.
- Saturday: 10:00 a.m. – 7:00 p.m*.
- Sunday: 2:00 p.m. – 12 p.m.

[*Note: As of Fall 2010, the library is open 10:00 a.m. until 7:00 p.m., except on those Saturdays when the LU football team has a home game. On those Saturdays, the library is open 8:00 a.m. until 12 noon.]

Reference service is available 95.5 hours per week. Users have access to the stacks at all hours when the library is open. Access to the library’s electronic resources is available literally 24/7.

A general access PC lab is located on the seventh floor of the library in the Media Services department. The lab contains one hundred and twenty IBM compatible computers with laser printers attached to every PC. Standard and oversize color ink jet and color laser prints are available, as well as CD and DVD duplication and scanners. The lab hours are the same as the general library hours, and assistance is available from support staff. The lab offers over two dozen general programs including word processing, spreadsheets, databases, programming languages, desktop publishing, statistical programs, and computer graphics programs.

The Media Services department also houses a video collection (DVD and tape), CDs, and records. A circulating equipment collection provides support for classroom instruction and can be scheduled by professors throughout the semester.

Professional Library Staff Assigned to Engineering Unit
The librarian who serves as the engineering library liaison works closely with engineering faculty and department chairs in collection development and in delivery of reference and library instruction service. As stated above, the librarian receives support
from the reference librarians, various support staff, and the interlibrary loan services unit. Engineering materials are ordered by the acquisitions staff, cataloged by cataloging staff, checked in (journals) and circulated by other support staff. These staff members are supervised by librarians who coordinate their efforts.

F. Overall Comments on Facilities

To ensure that our students have a safe environment to work in, all students are required to follow appropriate safety protocols whenever they are in a lab performing lab experiments or using lab equipment for a class or for research. Safety procedures appropriate to each exercise are discussed at the beginning of the lab period. Students who are unfamiliar with the operation of any piece of lab equipment or the use of any chemicals are carefully supervised by experienced lab instructors and/or graduate assistants. First aid kits, safety eye wash fountains are located in close proximity to the labs in case of emergency. In addition, hazardous materials are inventoried periodically and they are always placed in safe storage. The vigilance of our faculty and lab staff has rewarded us with an outstanding safety record with no student injuries in over a decade.
CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

The leadership of the LUEE program consists of a department chair with no set term (serves at the discretion of the dean) and an undergraduate advisor. The balance of the faculty perform graduate advising. Given the small size of the program, this structure is fully adequate to insure program quality and continuity. The department chair is responsible for the program and from an academic standpoint directs every aspect of the undergraduate activities. In the graduate program, the chair defers to individual faculty and the student graduate committees.

The undergraduate advisor, who is a senior faculty member, assists students in the upper division and verifies that course sequencing is maintained. This is an administrative activity and the faculty member is assisted by the department senior administrative associate. Again, because of the small size of the program, students in the upper division are highly constrained in what courses may be taken in any given semester, so the advising process is simplified.

The department chair reports to the dean, who reports to the provost, who reports to the president. As such, there is a short path from the department leadership to that of the university so that decisions that affect the program may be dealt with quickly and effectively.

B. Program Budget and Financial Support

The budget for the Department of Electrical Engineering is determined from state allocations as established by the legislature; however, there are other sources of funding that the department has available to it and these are discussed below:

*Higher Education Assistance Funds (HEAF):* An annual appropriation used for acquiring, constructing, or improving tangible assets. HEAF funds are allocated directly to departments from the Provost's office based on perceived and anticipated needs. The funds are relatively unrestricted and are typically used to improve equipment used in the program. HEAF has averaged roughly $22,000/year and has been spent to improve faculty office equipment and laboratories. HEAF is an annual allocation and must be spent before the end of the fiscal year. The department has also received special HEAF allocations beyond the yearly fixed amounts. The amount received has been roughly $72K which was used for lab upgrades, purchase of HF signal processing equipment and research tools.

*Gifts/donations: All donations are processed by the University Advancement Office and are distributed to the department either in scholarship accounts, which must be used exclusively for that purpose, or as funds deposited into an unrestricted account. The latter is an account that is undesignated and may be used for purchases not normally allowed for using state accounts. Our most significant gift was from 1968*
graduate Philip M. Drayer. Mr. Drayer has established an estate gift of $5M, with an initial seed of $250,000 in an endowment.

*Sponsored Research:* Research accounts are controlled and maintained by the individual PI's that acquire the funding. On overhead generating research, the department receives an allocation determined at the time of proposal submission and disbursed from a college account. At present, the department has no funds available from this option; however, faculty have been successful in receiving small grants and collaborative grants that do not generate overhead funds.

The budgeting process for the University and College of Engineering is as follows:

The Provost provides the previous year Educational and General State Appropriation budget to the Dean of each college in the Spring. This budget is for salaries and benefits for staff and faculty for the college, departments and divisions. The budget is reviewed and returned with faculty and staff changes to the Provost and Vice President for Finance.

Annual faculty reviews are performed by Department Chairs and recommendations for merit pay are submitted to the Dean. The Dean provides Department Chair reviews and submits recommendations for merit pay for both Chairs and faculty to the Provost.

The operating budget for the College, Departments and Divisions are revised based on submission of requests from the department and the College.

Classroom, infrastructure, laboratory and research funds are budgeted through the Office of the Provost with State Appropriated Higher Education Assistance Funds (HEAF). These funds are based on the College’s annual proposals to the Provost.

Funds for enhancing research are available through two sources: (1) Return of overhead grant funds from research grants and (2) State funds returned to the University based on grant funds awarded in the previous legislative year.

Scholarship funds are available through endowments in the University and the University Foundation.

**C. Staffing**

The department enjoys the services of two full-time staff members, a Senior Administrative Associate and a Laboratory Manager. Their service to the department has a significant effect on day-to-day operations and the maintenance of a student-centered environment that is a component in the accomplishment of our program objectives. Training of staff is conducted on a regular basis by the Department of Human Resources. The department seeks to provide a comfortable and interesting work environment that is supportive and appreciative and this aids in the retention of staff workers. Both staff positions have extensive longevity.
D. Faculty Hiring and Retention

No new faculty positions have been made available to LUEE since 2008. The hiring process includes a nationwide search, candidate review by a departmental committee, the Department Chair, the College of Engineering Dean, and the Provost.

Salaries are well-matched to similar universities based on rank from national surveys. Significant merit based raises were available between 2007 and 2010; however, the economy and budget cuts have eliminated merit raises. Raises associated with promotion have been consistently awarded. Benefits are established by the State of Texas.

Faculty are encouraged and supported to pursue professional development and research and are recognized for their accomplishments. For example, four times yearly the Provost requests data for a report with the title: "Accomplishments of LU Students and Faculty" that is presented at the Texas State University System Board of Regents meeting by the President. LUEE faculty and students consistently appear in this report, often in every issue over a year's time. In terms of monetary recognition, a number of special prizes are available to faculty for exceptional work in research and teaching.

E. Support of Faculty Professional Development

As discussed earlier in section 6-D, the Center for Teaching and Learning Enhancement conducts regular workshops, training sessions and the hosting of guest speakers aimed at faculty professional development. Sabbatical leaves are available through the provost's office. Travel is supported and each faculty member is able to travel at least once yearly.
CRITERION 9 PROGRAM CRITERIA

Our program is constrained to that specific for Electrical Engineering, which includes the following topics from Criterion 9:

The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.

Our program satisfies the breadth requirement by addressing the foundational areas of electrical engineering across 48 credit hours taught by department faculty that represents 38.7% of the total (124 hours) curriculum. We also place a strong emphasis on math, which is a foundational requirement of electrical engineering given the extreme levels of abstraction inherent in the discipline, and in that respect we devote 21 credits or 17% of the program. Breadth is also demonstrated in the spread observed across our program outcomes as seen in Table 4.1 EE Course Outcomes Matrix.

For depth we rely on our senior level electives (six credits) and our culminating design experience (ELEN4206/4207) and seminar course (ELEN4101/4102).

The curriculum must include probability and statistics, including applications appropriate to the program name; mathematics through differential and integral calculus; sciences (defined as biological, chemical, or physical science); and engineering topics (including computing science) necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components.

Our graduates have knowledge of probability and statistics from multiple sources: 1) MATH3370 Intro to Theory of Statistical Inference, 2) INEN2273 Engineering Economics (also permitted is a general studies economics course) and 3) ELEN3381 Electrical Analysis as well as from the sciences.

In our Senior Projects course, students design complex electrical and electronic devices using software tools and incorporating hardware and software components.

A sampling of recent examples of these include the following:

ICARUS† -- The I.C.A.R.U.S. (Integration and Control of Alternative Resources for Utility Systems) Project Team will submit a paper that details a hypothetical expansion for the King Mountain Wind Farm near McCamey,

† The ICARUS team won first place ($2K+trophy) in the 2012 IEEE/CCET Student Design Contest.
Texas. The expansion will incorporate solar arrays and possibly battery storage. Ultimately, this design will serve to increase load factor and facilitate more reliable and consistent power production. The design will include a complete operations algorithm to simplify and optimize management and control as well as ensure safety. This algorithm will consider several operational scenarios, including normal and emergency conditions. In addition, the design will take into account various economic considerations to determine the overall feasibility of the project. This data will also assist in various decisions throughout the project, including the choice of equipment and the decision on whether or not to include battery storage.

In the spring semester, the team will attempt to simulate its submitted design.

**iTeach** -- Team iTeach will be competing in the Ability1 Design Challenge, 2012. This competition calls for a team of students to design a product or system that will help someone with a disability in the workplace to overcome an obstacle that the disability presents. The competition also requires a video and report submission. Team iTeach will be working with Alyssa Courts, a teacher at Vincent Middle School in Beaumont, TX, to develop a teaching aide with a universal design. Mrs. Courts is confined to a wheelchair and cannot easily monitor the classroom while writing on the board. It is difficult for her to give full attention to the special needs children that are in her class. The iTeach design will incorporate existing touch-pad and wireless technologies with a newly-developed software program to help her effectively manage classroom routines while focusing more on the students.

**Airflow Energy Harvesting Mount** -- Team “Airflow Energy Harvesting Mount” will design and construct a product that will harvest the wasted energy typically produced by the condenser units of central air conditioning systems. Other applications of the energy harvesting device will also be considered. The prototype will be mounted atop a typical condenser unit and access the heated airflow that it exhausts. The design will be such that it will not affect the overall performance of the central air conditioner. Key components that will be incorporated into the product are: a generator (converts mechanical energy into electrical), a battery of capacitor subsystem (energy storage), and an inverter (converts the DC source to AC power). The product will make a substantial amount of renewable energy for a variety of domestic and industrial applications such as lighting.

The curriculum for programs containing the modifier “electrical” in the title must include advanced mathematics, such as differential equations, linear algebra, complex variables, and discrete mathematics.

Table 5-1 listed mathematics and science courses taken by our students that develop knowledge of differential equations, linear algebra, complex variables and discrete mathematics. Differential Equations are given extensive treatment in MATH3301 and complex variables are also covered there. Linear algebra is
treated in MATH2318 as well as some aspects of discrete math. Figure 9-1 illustrates the demonstration linkages into our program outcomes base (required courses).

Figure 9-1 Linkage between advanced mathematics instruction and curriculum skill usage and assessment.

The figure shows instruction on the left with the set of required mathematics courses in the program. The center box lists the ABET required knowledge that graduates must have downstream from the appropriate the source courses where those topics are taught. The boxes at the right show the EE curriculum courses where those skills are required and thus indirectly assessed through our program outcomes assessment process.

As a final note, LUEE students who choose an extra math course for one of their senior electives are awarded a minor in mathematics.
APPENDICES
Appendix A – Syllabi

1. ELEN 1100 Introduction to Electrical Engineering

2. Credits: 1

3. Instructor: Koji Hirano


5. Specific Course Information
   a. Catalog Description: A survey of electrical engineering principles and introduction to the design process with emphasis on signal processing hardware and software.
   b. Prerequisites: None.
   c. Required

6. Specific goals for the course:

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:
   • Understand basic engineering formula and concepts related to electrical engineering. (Criterion 3(a))
   • Understand binary states, basic logic functions, and Boolean algebra. (Criterion 3(a))
   • Understand logic function minimization, and minimization tools. (Criterion 3(a))
   • Use software (LabVIEW) in the laboratory. (Criterion 3(b))
   • Use proto-circuit board hardware with an electronic laboratory virtual instrument system (ELVIS II). (Criterion 3(b))

7. Topics (approximate number of lecture hours):

   Lecture Topics
   • Introduction to electrical engineering. (1 hr) (Criterion 3(a))
   • DC circuit fundamentals. (3 hrs) (Criterion 3(a))
   • DC circuits, inductance, transformers. (1 hr) (Criterion 3(a))
   • AC circuits; capacitors. (1 hr) (Criterion 3(a))
   • AC current, voltage; capacitors. (1 hr) (Criterion 3(a))
   • RC circuits; inductance, transformers. (1 hr) (Criterion 3(a))
   • Field of electrical engineering. (1 hr) (Criterion 3(a))
   • Binary numbers, decimal-binary conversions. (1 hr) (Criterion 3(a))
   • Digital logic devices, truth tables, Boolean logic. (1 hr) (Criterion 3(a))
   • Logic functions, minimizations. (2 hrs) (Criterion 3(a))
Appendix A -- Syllabi

- Wireless communications; RLC resonance. (1 hr) (Criterion 3(a))
- Operational amplifiers; ideal op-amp circuit gains. (1 hr) (Criterion 3(a))

Lab Topics

- Intro to LabVIEW. (2 hours) (Criterion 3(b))
- Sound Processing with LabVIEW. (2 hours) (Criterion 3(b))
- Image Processing with LabVIEW. (2 hours) (Criterion 3(b))
- TCP/IP with LabVIEW. (2 hours) (Criterion 3(b))
- Process Control with LabVIEW. (2 hours) (Criterion 3(b))
- Intro to ELVIS II system. (2 hours) (Criterion 3(b))
- ELVIS-Digital Logic Paradigmatic Lab. (2 hours) (Criterion 3(b))
- ELVIS-Circuits Paradigmatic Lab. (2 hours) (Criterion 3(b))
- ELVIS-Electronics Paradigmatic Lab. (2 hour) (Criterion 3(b))
- ELVIS-Electromagnetics Paradigmatic Lab. (2 hours) (Criterion 3(b))
- ELVIS-Control Systems Paradigmatic Lab. (2 hours) (Criterion 3(b))
Appendix A -- Syllabi

1. ELEN 2411 Circuits I

2. Credits: 4 (3 Lecture and 1 Lab)

3. Instructors: Wendell Bean (lecture) and Selahattin Sayil (lab)


5. Specific Course Information

   a. Catalog Description: Linear network analysis. Fundamental network laws and methods. Transient response. Sinusoidal steady state analysis and response. Lab experience in the use of elementary electrical equipment and elements, including the oscilloscope.

   b. Prerequisite: MATH 2414 Calculus & Analytic Geometry II, PHYS 2426 Calculus Based Physics II

   c. Courses that require this course as a prerequisite: ELEN 3312, ELEN 3421, ELEN 3371 and ELEN 3381.

   d. Required.

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes):

   Lecture: Ensure students:

   • Understand the basic concepts of Ohm's law and Kirchhoff's loop voltage and node current laws. (Criterion 3(a))
   • Understand DC and AC circuit analysis for multiple sources, both independent and dependent sources. (Criterion 3(a))
   • Know how to develop Thevenin and Norton equivalent circuits and use in varying load calculations and impedance matching. (Criterion 3(a),(e))
   • Can understand and derive first-order differential equations describing circuit variables in transient analyses. (Criterion 3(a),(e))
   • Can perform steady-state sinusoidal analysis of linear lumped-parameter circuits. (Criterion 3(a),(e))

   Lab: Ensure students:

   • Are able to use elementary electrical equipment and elements. This equipment will include voltmeters, digital voltmeters, signal generators, oscilloscopes and National
Appendix A -- Syllabi

Instruments Electronic Laboratory Virtual Instrument System (ELVIS) console. (Criterion 3(b),(d),(k))

- Are able to use NI ELVIS system and their protoboards to analyze electrical circuits. (Criterion 3(b),(d),(k))
- Are able to gather data and write reports as part of their laboratory assignments. (Criterion 3(b),(g),(k))
- Will gain hands on experience on KCL, KVL, mesh and nodal analysis. (Criterion 3(a),(b),(d),(k))
- Will gain hands on experience on network theorems such as Superposition, Thevenin, Maximum Power. (Criterion 3(a),(b),(d),(k))
- Will put into practice the theory they learned on high pass, low pass filter and resonance circuits. (Criterion 3(a),(b),(d),(k))
- Are able to do impedance measurements. (Criterion 3(a),(b),(d),(k))
- Are able to measure transient response of RL, RC and RLC circuits. (Criterion 3(a),(b),(d),(k))

7. Topics (approximate number of lecture hours):

- Voltage, current, power, Ohm's law. (2 hours)
- Kirchhoff's laws for loop/mesh voltages and node currents with simple circuits. (2 hours)
- Equivalent resistance used with voltage and current division principles. (2 hours)
- Nodal analysis and supernodes. (2 hours)
- Mesh analysis and supermeshes. (2 hours)
- Superposition and source transformations. (2 hours)
- Thevenin/Norton equivalent circuits; maximum power to load. (2 hours)
- Capacitors and inductor, stored energy effects. (1 hour)
- Source-free RL and RC circuits, time constants. (2 hours)
- Driven RL and RC circuits. (4 hours)
- Parallel RLC circuits. (4 hours)
- Series RLC circuits. (3 hours)
- Complete responses of RLC circuits. (3 hours)
- Sinusoidal voltages, currents, phasors. (3 hours)
- Impedance and admittance. (1 hour)
- Frequency-domain equivalent circuits. (1 hour)
- Sinusoidal steady-state analysis methods. (5 hours)

Topics (One lab each week):

- Introduction to ELVIS NI. Voltage and current division.
- Kirchhoff's laws-loop and nodal analysis. Linearity and Superposition Theorem.
- Transient response of RC circuit. Transient response of RL circuit
- Resonance in RLC circuits. Lowpass & highpass filters.
- Bandpass filters. Impedance measurement.
- Thevenin equivalent and maximum power transfer.
Appendix A -- Syllabi

1. ELEN 3312 Circuits II

2. Credits: 3

3. Instructor: Dr. Bean


5. Specific Course Information


   b. Prerequisite: ELEN 2411 Circuits I with grade of C or better; Corequisite: MATH 3301 Ordinary Differential Equations.

   c. Courses that require this as a prerequisite: ELEN 3313, ELEN 3341

   d. Required

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:

   • Can perform complex-frequency domain analysis of linear, lumped parameter circuits using Laplace transform techniques. (Criterion 3(a))
   • Understand the relationship between time-domain, complex frequency domain, and frequency domain techniques. (Criterion 3(a))
   • Are able to analyze passive frequency-selective circuits. (Criterion 3(a))
   • Understand Fourier series and Fourier transform, and their application in circuit analysis. (Criterion 3(a))
   • Can analyze two-port circuits. (Criterion 3(a))

7. Topics (approximate number of lecture hours):

   • Average power; rms V and I; power factor; apparent and complex power. (3 hours)
   • Three-phase systems, delta and wye connected sources and loads; Two-watt meter power measurement. (3 hours)
   • Mutual inductance; ideal transformer; primary and secondary voltage and current ratios. (2 hours)
   • Voltage adjustments; transformers and impedance matching for maximum load power. (1 hour)
Appendix A -- Syllabi

- Complex frequency; Laplace transforms, -for time functions; inverse transform techniques, basic Laplace theorems. (3 hours)
- S-Domain circuit analysis; Z(s), Y(s) use; node and mesh analysis; poles, zeros; transfer functions. (3 hours)
- Convolution integral frequency dependence of magnitude and phase; natural response and the s-plane. (3 hours)
- Parallel resonance, quality factor; bandwidth; series resonance; high Q circuit approximations. (3 hours)
- Bode diagrams, asymptote approximations for magnitude db and phase plots; filter frequency responses. (2 hours)
- One and two port networks; admittance, impedance, hybrid, and transmission parameters. (4 hours)
- Fourier series; Fourier circuit analysis; coefficient evaluation and use of symmetry; Fourier transform; transform-time function pairs; system function concept. (4 hours)
Appendix A -- Syllabi

1. ELEN 3313 Signals and Systems

2. Credits: 3

3. Instructor: Wendell Bean


5. Specific Course Information


   b. Prerequisites: ELEN 3312 Circuits II, MATH 2318 Linear Algebra, and MATH 3301 Ordinary Differential Equations with grade of C or better.

   c. Courses that require this course as a prerequisite: ELEN 4351, ELEN 4206

   d. Required

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:

   • Can analyze and design circuits containing ideal operational amplifiers. (Criterion 3(a),(c),(e))
   • Understand the effect of system poles and zeros on the transient and frequency responses of systems. (Criterion 3(a))
   • Understand the concept of a system, and basic LTI system properties. (Criterion 3(a),(e))
   • Understand the analysis of linear time-invariant (LTI) systems using convolution. (Criterion 3(a))
   • Can design LC and RC analog filters as realizable networks with specified element values and circuit configurations. (Criterion 3(a),(c))

7. Topics: (approximate number of lecture hours):

   • System functions; common and difference mode excitations and responses. (2 1/2 hours)
   • Network poles; time response; frequency response and Bode plots. (4 hours)
   • Input impedance; magnitude and frequency scaling; zeros and poles of LC and RC networks. (4 hours)
   • LC Foster network design; LC Cauer network design. (2 1/2 hours)
   • RC Foster network design; RC Cauer network design. (2 1/2 hours)
Appendix A -- Syllabi

• Ladder networks; transfer function realization of two-port LC ladder designs using resistive terminations at the input port, or at the output port. (6 hours)
• Second-order systems; step response characteristics; frequency response. (1 1/2 hours)
• Pole-zero loci of second-order circuits; sensitivity functions for circuit measure changes due to small deviations in circuit parameter values. (2 1/2 hours)
• Ideal operational amplifier characteristics; op-amp circuits for various signal functions. (2 1/2 hours)
• Actual operational amplifier characteristics; three-pole model, frequency response; stability conditions. (2 1/2 hours)
Appendix A -- Syllabi

1. ELEN 3421 Electronics I

2. Credits: 4 (3 Lecture and 1 Lab)

3. Instructor: Selahattin Sayil


5. Specific Course Information

   a. Catalog Description: Design and analysis of circuits using diodes, transistors, and linear and digital integrated circuits. Design of amplifiers using transistors, and linear integrated circuits.

   b. Prerequisites: ELEN 2411 Circuits I with grade of C or better.

   c. Required

6. Specific goals for the course

   Objectives for lecture(with corresponding ABET Criteria/outcomes): Ensure Students:

   - Are familiar with current and future applications of electronics with an emphasis on microelectronics. (Criteria 3(h),(i))
   - Understand basic physics and operation of diodes, BJTs, MOSFETs and JFETs. (Criterion 3(a))
   - Are able to learn the functional purpose of discrete components and integrated circuits by having hands on experience. (Criterion 3(a),(b),(d),(k))
   - Physically test and study the characteristics of different types of diodes. (Criterion 3(a),(b),(d),(k))
   - Are able to gain hands on experience on designing and analyzing clipper and clamper diode circuits using NI Electronic Laboratory Virtual Instrument System (ELVIS) console. (Criterion 3(a),(b),(c),(d),(k))
   - Learn how to derive DC and AC characteristics for BJT and FET transistor amplifiers by taking measurements. (Criterion 3(a),(b),(c),(d),(k))
   - Learn how to measure non-ideal parameters for a real Operational Amplifier. (Criterion 3(a),(b),(c),(d),(k))
   - Understand advanced uses of op-amps using hands on experience. (Criterion 3(a),(b),(c),(d),(k))
   - Are able to use NI ELVIS system and their NI ELVIS boards to analyze and design electronics circuits. (Criterion 3(a),(b),(c),(d),(k))
   - Are able to gather data and write reports as part of their laboratory assignments. (Criterion 3(a),(b),(g),(k))
   - Understand the concepts of DC and small-signal analyses. (Criterion 3(a))
Appendix A – Syllabi

- Understand the analysis and design of basic amplifier configurations. (Criterion 3(a),(c))
- Are able to use the circuit simulator SPICE for analysis of electronic circuits. (Criteria 3(a),(b),(k))
- Understand the ideal op-amp and various op-amp applications. (Criterion 3(a),(c))

Lab Ensure students:

- Are able to learn the functional purpose of discrete components and integrated circuits by having hands on experience. (Criterion 3(a),(b),(d),(k))
- Are able to design active component circuits and enhance their test and measurement skills. (Criterion 3(a),(b),(c),(d),(k))
- Physically test and study the characteristics of different types of diodes. (Criterion 3(a),(b),(d),(k))
- Are able to gain hands on experience on designing and analyzing clipper and clamper diode circuits using NI Electronic Laboratory Virtual Instrument System (ELVIS) console. (Criterion 3(a),(b),(c),(d),(k))
- Learn how to derive BJT transistor characteristics for different configurations by experimentation. (Criterion 3(a),(b),(d),(k))
- Learn how to derive DC and AC characteristics for BJT and FET transistor amplifiers by taking measurements. (Criterion 3(a),(b),(c),(d),(k))
- Learn how to measure non-ideal parameters for a real Operational Amplifier. (Criterion 3(a),(b),(c),(d),(k))
- Understand advanced uses of op-amps using hands on experience. (Criterion 3(a),(b),(c),(d),(k))
- Are able to use NI ELVIS system and their NI ELVIS boards to analyze and design electronics circuits. (Criterion 3(a),(b),(c),(d),(k))
- Are able to gather data and write reports as part of their laboratory assignments. (Criterion 3(a),(b),(g),(k))

7. Topic (approximate number of lecture hours)

- Introduction to semiconductors, and diode physics. (3 hours)
- Diodes: physics, DC and small-signal model, applications. (5 hours)
- BJTs: physics, biasing, small-signal model. (6 hours)
- BJT single-stage amplifiers: analysis and design. (6 hours)
- MOSFETs, JFETs: physics, DC analysis, small-signal model. (8 hours)
- MOSFET single-stage amplifiers: analysis and design. (6 hours)
- The Ideal Operational amplifier. (4 hours)
- Operational Amplifier applications (3 hours)

Topics (one lab each week)

<table>
<thead>
<tr>
<th>Diode Characteristics</th>
<th>Diode Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>BJT Characteristics</td>
<td>BJT Amplifiers</td>
</tr>
<tr>
<td>JFET Characteristics</td>
<td>Op-Amp Characteristics</td>
</tr>
<tr>
<td>Op-Amp Applications -I</td>
<td>Op-Amp Applications -II</td>
</tr>
<tr>
<td>JFET Amplifiers</td>
<td></td>
</tr>
</tbody>
</table>
Appendix A -- Syllabi

1. ELEN 3322 Electronics II

2. Credits: 3

3. Instructor: Selahattin Sayil


5. Specific Course Information

   a. Catalog Description: In depth study of semiconductor devices and integrated circuit characteristics, stability, feedback amplifiers and frequency response.

   b. Prerequisite: ELEN 3321 Electronics I and ELEN 3312 Circuits II with grade of C or better.

   c. Required

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:

   - Are familiar with current and future applications of electronics with an emphasis on microelectronics. (Criteria 3(h),(i))
   - Are able to design and analyze operational amplifier circuits (Criterion 3(a), (c))
   - Understand the non-ideal effects in operational amplifier circuits (Criterion 3(a)).
   - Understand the frequency response of transistors and the effect of circuit capacitors on the frequency response (Criterion 3(a)).
   - Are able to construct the Bode plots of amplifier circuits. (Criterion 3(a))
   - Understand characteristics of Power transistors and power amplifiers. (Criterion 3(a))
   - Understand integrated circuit biasing and current source configurations. (Criterion 3(a),c))
   - Are able to analyze differential and multistage amplifiers. (Criterion 3(a))
   - Are able to analyze feedback circuits, and understand the stability of feedback circuits (Criterion 3(a)).
   - Are able to design integrated circuits for a target application. (Criterion 3(a), (c))
   - Are able to use the circuit simulator SPICE for analysis of electronic circuits. (Criteria 3(a),b),(k))

7. Topics (approximate number of lecture hours):

   - Current and future applications of electronics (1 hour)
   - Op-amp applications (3 hours)
Appendix A -- Syllabi

- Frequency response of transistors and transistor amplifiers (6 hours)
- Power transistors and power amplifiers (3 hours)
- Integrated circuit biasing, current mirrors (6 hours)
- Differential and multistage amplifiers (6 hours)
- Analysis of feedback circuits, and Stability (6 hours)
- Nonideal effects in Analog IC’s (4 hours)
- Applications of integrated circuits (5 hours)
Appendix A -- Syllabi

1. ELEN 3371 Electromagnetics I

2. Credits: 3

3. Instructor: Gleb Tcheslavski


5. Specific Course Information

   a. Catalog Description: Vector analysis, coordinate systems, static and quasi-static electric fields, electric potential, dielectrics, capacitance, current, conductance, magnetic vector potential, electromagnetic forces. Maxwell's Equations, plane waves, transmission lines and Smith chart analysis.

   b. Prerequisites: MATH 2318 Linear Algebra, MATH 3301 Ordinary Differential Equations, ELEN 2311 Circuits I, and PHYS 2426 Calculus Based Physics II with grade of C or better.

   c. Courses that require this as a prerequisite: ELEN 3441 Fundamentals of Power Engineering

   d. Required

6. Specific goals for the course

   Objectives (with corresponding student learning ABET Criteria/outcomes):

   Ensure students:
   - Understand how electromagnetics broadly permeates electrical engineering disciplines such as circuits, electronics, VLSI, communications, power systems, computer engineering, controls, antennas, electromagnetic transmission lines, and optical engineering. (Criterion 3(f),(h))
   - Garner an appreciation for the need for vector calculus concepts in applying Maxwell's Equations to the design of electrical engineering equipment and systems. Become attentive to the assumptions that are implicit in these developments and where these assumptions are no longer valid extend this appreciation to the appropriate mathematical formulations. (Criterion 3(a),(b))
   - Be able to write Maxwell's Equations in differential form and the constitutive relations between the flux densities and field intensities of the electric and magnetic fields. (Criterion 3(a))
   - Recognize the Helmholtz wave equations in its various forms and the wave nature of their solutions for time-harmonic waves. Acquire an appreciation for the physical
Appendix A -- Syllabi

form of the corresponding wave (such as plane wave, spherical wave and their direction of travel) by simply observing the form of the wave phasor. (Criterion 3(a),(b))
• Acquire an understanding of guided waves and the development and use of the Smith Chart for electromagnetic transmission-line analysis. Be able to work transmission-line problems through the "stub matching ". (Criterion 3(b),(c),(e))
• Appreciate the concepts of scalar and vector potential fields and their applications to electromagnetic antennas. Acquire an understanding of the basic Hertzian dipole and various other antennas that stem from it. Become aware of various antenna patterns and how they can be used in antenna design and applications. (Criterion 3 (b),(c),(e))
• Appreciate how electromagnetic concepts provide the foundations for optical engineering such as fiber optic communications and holography. (Criterion 3(b),(c),(e))
• Recognize and appreciate how electromagnetics concepts may be applied to individual topics of interest by preparing an engineering presentation to the class on a specific area of interest. (Criterion 3(e),(g),(h))

7. Topics (approximate number of lecture hours):

• Introduction to Electromagnetics I with review of vector calculus. (4)
• Static Fields. (2)
• Boundary Value problems. (2)
• Time-varying Electromagnetic Fields. (4)
• Maxwell's Equations. (6)
• The Helmholtz Wave Equations and Plane Waves. (6)
• Reflection and Transmission of Waves. (2)
• Electromagnetic Transmission Lines and the Smith Chart. (5)
• Antennas: linear, loop, array antennas. (4)
• Individual topics in field and waves in modern communications. (4)
• Review (1)
Appendix A -- Syllabi

1. ELEN 3381 Electrical Analysis

2. Credits: 3

3. Instructor: Gleb Tcheslavski


5. Specific Course Information

   a. Catalog Description: Application of computers to analysis and design of electrical systems using numerical methods, in-depth study of Matlab.

   b. Prerequisite: ELEN 2311 Circuits I, MATH 2318 Linear Algebra, and MATH 3301 Ordinary Differential Equations with grade of C or better.

   c. Courses that require this as a prerequisite: ELEN 4206

   d. Required

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:

   - Acquire an appreciation for the potential of the modern computer for solving numerical problems that may arise in electrical engineering careers. (Criterion 3(a),(b))
   - Develop and hone problem solving and programming skills. (Criterion 3(a))
   - Acquire extensive skills working with Matlab. (Criterion 3(b),(e),(j),(k))
   - Understand how errors arise in numerically solving problems with digital computers, how to detect and predict them, and learn methods for minimizing and controlling these errors. (Criterion 3(a))
   - Individually perform a numerical computer experiment using advanced numerical analysis methods, write a formal engineering report. (Criterion 3(a),(b),(e),(g))

7. Topics (approximate number of lecture hours):

   - Introduction: terminology and Matlab overview (3).
   - Matlab basics: Matlab variables, Matrices and Vectors, Plotting in Matlab (7).
   - Matlab programming: Script and function files, Flow control, Vectorization (5).
   - Unavoidable errors in computing: Number representation, Finite precision arithmetic, Truncation errors (5).
   - Finding the roots of $f(x) = 0$: Fixed-point iteration, Bisection, Newton’s method, Secant method (4).
Appendix A -- Syllabi

- A review of Linear Algebra: Vectors, Matrices, Math properties of vectors and matrices, Special matrices (5).
- Solving systems of equations: Basic concepts, Gaussian elimination, Limitations of numerical solutions to $Ax = b$, Factorization (5).
- Least-square fitting of a curve to data: Fitting a line to data, Fitting to a linear combination of functions (4).
- Interpolation: The idea, Interpolating polynomials of arbitrary degree, Piecewise polynomial interpolation (4).
- Final review (1).
Appendix A -- Syllabi

1. **ELEN 3431 Digital Logic Design**

2. Credits: 4 (3 Lecture and 1 Lab)

3. Instructor: Ganesha Narasimha Reddy


5. Specific Course Information


   b. Prerequisites: ELEN 1100: Introduction to Electrical Engineering

   c. Required

6. Specific Goals for the course:

   Objectives (with corresponding **ABET Criteria/outcomes**):

   Lecture

   Ensure Students:

   1. Able to define basic logic gates 3(e)
   2. List logic equations to solve simple problems & draw corresponding logic diagrams 3(e)
   3. Able to do the following with basic logic equations: list, draw, and evaluate 3(e)
   4. Understand Boolean rules and laws 3(e)
   5. Understand DeMorgan’s theorem 3(e)
   6. Able to simplify logic equations using Boolean rules and laws 3(e)
   7. Understand standard forms logic equations 3(e)
   8. Able to do logic simplification using the structured methods: Karnaugh-Map (K-map) method 3(e)
   9. Able to understand basic logic functions 3(e)
   10. Identify the following with for each logic function: truth-table, logic-equation, and logic diagram 3(e)
   11. Understand basic types of memory elements or flip-flops 3(e)
   12. Able to design various types of shift-registers and build some of them 3(e)
   13. Able to design various types of counters and build some of them 3(b), (e)
   14. Understand various types of memory storage technologies 3(e)
   15. Understand memory organization 3(e)
   16. Understand memory decoding 3(e)
   17. Understand basic computer architecture 3(e)
Appendix A -- Syllabi

18. Able to do very rudimentary assembly language programming 3(e)
19. Understand basic modern computer architectures 3(j)
20. Understand basic computer devices 3(c)
21. Understand interfacing real-world-signals to the computer: ADC & DAC 3(c)
22. Are familiar with modern hierarchy of digital hardware design 3(j)
23. Are familiar with the state-of-the-art computer hardware design methodologies 3(j)
24. Have learned how find knowledge of digital logic on electronic media 3(k)
LABORATORY:
25. Have learned how to design and simulate logic circuits 3(k)
26. Have learned how to search, find, and read data sheets of various logic gates and functions 3(k)
27. Have gained sufficient hands-on experience in building real-digital circuits 3(b), (c)

7. Topics (approximate number of lecture hours):

1. Modern hierarchy of digital hardware design (1)
2. Introduction to digital hardware design languages (1)
3. Logic gates (2)
4. Boolean algebra (2)
5. Combinational-logic functions (3)
6. Logic simplification methods (2)
7. Number systems, Analog-to-digital-converters ADCs & Digital-to-analog converters DACs (2)
8. Memory Elements - flip-flops (2)
9. Sequential logic functions: Shift-registers (1)
10. Sequential logic functions: Counters (1)
11. Memory Types (1)
12. Memory Organization (1)
13. Memory Decoding (2)
14. Computer devices (2)
15. Basic Computer Architecture (1)
16. Basic assembly language programming (1)
17. Modern Computer Architectures (2)
Appendix A -- Syllabi

1. **ELEN 3441 Fundamentals of Power Engineering**

2. Credits: 4 ((3 Lecture and 1 Lab)

3. Instructor: Gleb Tcheslavski


5. Specific Course Information

   a. Catalog Description: Review of electro-mechanics and three phase circuit analysis. Principles of electromechanical energy conversion and energy delivery; operation of transformers, DC machines, synchronous machines, induction machines. Introduction to electric motor drives, power electronics and power network models. The per unit system. Newton-Raphson power flow. Symmetrical three phase faults. The laboratory includes the operation, analysis, and performance of transformers, motors, and generators.

   b. Prerequisites: ELEN 3312 Circuits II and ELEN 3371 Electromagnetics I with grade of C or better.

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes)

   Ensure student will be able to:

   - Convert between the English system and the SI system of units. (Criterion 3(a))
   - Learn the fundamentals of mechanical and electrical energy transfer especially for rotational machines. (Criterion 3(a),(c))
   - Understand how three-phase AC power is generated, the advantages of three-phase systems, and the advantages and disadvantages of various three-phase connections. Be able to recognize three-phase power distribution and transmission systems. (Criterion 3(a))
   - Become aware of the importance of transformer systems and learn about the various types of transformers and their characteristics. (Criterion 3(a),(c))
   - Learn the characteristics and applications of various types of DC and AC motors and generators and garner an appreciation for their principle advantages and disadvantages. (Criterion 3(a),(c))
   - Learn the characteristics and applications of power transmission lines and develop skills in power-flow analysis. (Criterion 3(a),(c))
   - Recognize electric distribution and transmission systems in the field and acquire an appreciation for the differences in the needs that they supply. (Criterion 3(c))
   - Obtain hand-on experience operating DC and AC electric motors and generators, which includes their appropriate wiring and experimental determination of their characteristics. (Criterion 3(b),(h),(j),(k))
   - Attain a respect for electric power systems and machinery and acquire a consciousness for safety for themselves and other people when working with and around electric machines and power systems. (Criterion 3(f),(g),(h))
Appendix A -- Syllabi

7. Topics (approximate number of 75-minute class periods):

- Electro-mechanical fundamentals. (4)
- Three-phase power circuits: Generation, Distribution, and Loading. (4)
- Transformers. (2)
- DC machines: characteristics of series and shunt wound types. (2)
- AC machinery fundamentals. (2)
- Synchronous machines. (2)
- Induction machines. (2)
- Transmission lines. (2)
- Power-Flow Studies. (7)
- Midterm and final exams (3)

Laboratory exercises:

- Lab safety and Lab-Volt overview.
- Serial, parallel, and serial-parallel connections of resistors and capacitors.
- Impedance.
- 3-phase circuits.
- Single-phase transformer
- 3-phase transformer.
- DC motors.
- DC generators.
- Synchronous motor.
- Split-phase induction motor.
- Capacitor-start and capacitor-run motors.
- Universal motor.
- Wound rotor induction motor.
- 3-phase alternator.
- Transmission line.
Appendix A -- Syllabi

1. **ELEN 4351 Control Engineering**

2. Credits: 3

3. Instructor: Wendell Bean


5. Specific Course Information

   a. **Catalog description:** An introduction to linear control theory in the classical and modern domains. This includes transfer functions, stability criteria, time response, frequency response, and state-space analysis and design.

   b. Prerequisites: ELEN 3313 Signals and Systems with grade of C or better.

   c. Required

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:

   - Know how to derive state space models from block diagrams, electrical circuits, and physical systems. (Criterion 3(a))
   - Use block diagrams to obtain closed-loop transfer functions. (Criterion 3(a))
   - Learn the system types and steady state errors. (Criterion 3(a))
   - Understand PID controllers and their relationship to Process Control. (Criterion 3(a),(e))
   - Analyze system stability using Routh table. (Criterion 3(a))
   - Understand the concepts of controllability and observability. (Criterion 3(a))
   - Understand the root locus and its use in design. (Criterion 3(a),(e))
   - Learn the observer design and observer-based compensator design. (Criterion 3(a),(e),(k))
   - Can design lead and lag compensators from Bode plots. (Criterion 3(a),(e),(k))

7. Topics (approximate number of 75-minute lectures):

   - The general concept of control system design. (2 Lectures)
   - Mathematical techniques for the control engineer. (2 Lectures)
   - Transfer function, block diagram, and signal flow graph. (2 Lectures)
   - State variable analysis, controllability, observability. (2 Lectures)
   - Feedback Control System Characteristics. (2 Lectures)
   - The Performance of Feedback Control Systems. (3 Lectures)
Appendix A -- Syllabi

• The Stability of Linear Feedback Systems. (2 Lectures)
• The Root Locus Method. (2 Lectures)
• Frequency Response Methods. (2 Lectures)
• Stability in the Frequency Domain. (2 Lectures)
• The Design of Feedback Control Systems. (5 Lectures)
Appendix A -- Syllabi

1. ELEN 4486 Microcomputers I

2. Credits: 4 (3 Lecture and 1 Lab)

3. Instructor: Ruhai Wang


5. Specific Course Information
   a. Catalog Description: This is an introductory course in microcomputers. This course primarily discusses the basics of microcomputers, microcomputer architectures, assembly language programming, and operating systems. The lab part concentrates on how to program Motorola’s 68HC12 microcontroller using the assembly language.

   b. Prerequisites: ELEN 2411 Circuit I, ELEN 3431 Digital Logical Design and ELEN 3421 Electronics I with a grade of “C” or better

   c. Required

6. Specific Goals for the Course:

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:
   - Understand the basics of computers, elementary computer operations, and the basics of Motorola's 68HC12 microprocessor. (Criterion 3(a))
   - Understand the hardware configuration and subsystems of the 68HC12 microprocessor, including register block, port system, clock and timer modules, memory system, analog-to-digital (ATD) converter, and communication systems. (Criterion 3(a))
   - Understand the reset and exception systems aboard the 68HC12 and know their operation. (Criterion 3(a))
   - Ability to use in simple assembly language programs the instruction set, addressing modes, branch instructions, and directives developed for and allowed by the 68HC12 microprocessor. (Criterion 3(b))
   - Ability to verify the content of registers and memory locations after executing a set of instructions. (Criterion 3(b))
   - Ability to use the stack memory for temporary data saving, parameter passing and procedure calling, and the D-Bug utility subroutines of the 68HC12 microprocessor. (Criterion 3(b))
   - Ability to use the internal register set of the 68HC12 microprocessors in real mode. (Criterion 3(c))
   - Ability to use the arithmetic and logic instructions for some basic operations. (Criterion 3(c))
   - Ability to write and analyze simple routines for file management. (Criterion 3(c))
7. Topics (approximate number of lecture hours):

- Introduction to computers and the 68HC12 microcontroller (2 lectures)
- Assembly language programming (5 lectures and 4 labs)
- Advanced assembly programming (6 lectures and 4 labs)
- Hardware configuration (3 lectures and 3 labs)
- Interrupts (4 lectures)
- Clock Module & Time Module (4 lectures)
- 68HC12 memory system (2 lectures and 2 labs)
- 68HC12 A/D Conversion System (2 lectures)
- 68HC12 Communication Systems (2 lectures and 2 labs)
Appendix A -- Syllabi

1. ELEN 4387 Microcomputers II

2. Credits: 3
3. Instructor: Ruhai Wang


5. Specific Course Information
   a. Catalog Description: This is an advanced course in microcomputers. This course primarily discusses microcomputer organization and architectures, advanced assembly language, CPU design, memory organization, interfacing with peripheral devices and computer software development systems.
   b. Prerequisites: ELEN 4486 Microcomputer I
   c. Required

6. Specific Goals for the Course

Objectives (with corresponding ABET Criteria/outcomes):

Ensure students:
- Understand the design and application of basic arithmetic circuits-adders, adder/subtractors, multipliers, dividers, and arithmetic logic units (ALUs). (Criterion 3(a))
- Understand design methods applied to a variety of shift registers and counters. (Criterion 3(a))
- Are familiar with the assembly language instruction set architectures. (Criterion 3(a))
- Understand a general-purpose computer organization and RTL. (Criterion 3(a))
- Have the ability to analyze and design a microcomputer organization including memory, I/O subsystems and their interfacing. (Criterion 3(c),(d))
- Understand the basics of CPU design and have the ability to analyze and design a simple CPU. (Criterion 3(a),(c),(d))
- Understand the microsequencer control unit design and have the ability to design and implement a simple microsequencer. (Criterion 3(a),(c))
- Understand memory organization and know the operation of hierarchialmemory systems, cache memory and virtual memory. (Criterion 3(a))
- Display familiarity with computer input/output organization. (Criterion 3(a))

7. Topics (approximate number of lecture hours):
- Review of digital logic fundamental and finite state machine. (4)
- Instruction set architectures and assembly language. (4)
- Computer organization. (6)
- Register Transfer Languages (RTL). (2)
- CPU design. (4)
Appendix A -- Syllabi

- Microsequencer control unit design (4)
- Memory organization. (4)
Appendix A -- Syllabi

1. ELEN 4101/4102 Electrical Engineering Seminar I/II

2. Credits: 1 each

3. Instructor: Harley Myler

4. Textbook: None.

5. Specific Course Information

   a. Catalog Description: Preparation, presentation and discussion of material on the engineering profession, the interface between technology and society, and new areas of engineering involvement.

   b. Corequisite: ELEN 4206/4207 Senior Projects Design I/II.

   c. Required.

6. Specific goals for the course

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students have:
   - knowledge of engineering problem solving approaches, ability to recognize disruptive technology and develop strategies to deal with it. (Criterion 3(e))
   - an understanding of professional and ethical responsibility. (Criterion 3(f))
   - an ability to communicate effectively through written and oral presentation. (Criterion 3(g))
   - an understanding of the impact of engineering solutions in a global, economic, environmental, and societal context. (Criterion 3(h))
   - a recognition of the need for, and an ability to engage in life-long learning and electrical engineering professionals. (Criterion 3(i))
   - a knowledge of contemporary issues through the development and critique of technical research papers and presentations. (Criterion 3(j))

7. Topics (approximate number of lecture hours):

   Technical Paper Preparation (FA: 1 hour)
   Disruptive Technology (FA: 1 hour)
   Problem Solving (FA: 1 hour)
Appendix A -- Syllabi

Entrepreneurship (FA: 1 hour)
Resume Development (FA: 1 hour)
Professionalism (SP: 1 hours)
Global Issues (SP: 2 hours)
Graduate Research (SP: 2 hours)
Ethics (SP: 2 hours)
Technical Presentation and Critique (SP: 8 hours)
Appendix A -- Syllabi

1. ELEN 4206/4207 Senior Design I/II

2. Credits: 2 each

3. Instructor: Harley Myler

4. Textbook: None.

5. Specific Course Information

   a. Catalog Description: Senior design projects with hardware implementation and testing. Preparation of project proposals, formal report and presentation.

   b. Corequisite: ELEN 4101/4102 Electrical Engineering Seminar I/II

   c. Required.

6. Specific goals for the course

   This is the senior capstone design experience of the electrical engineering program. It is designed to introduce the student to industrial projects. This pair of courses is a two-semester experience divided into two Phases:

   Phase I: Project Definition, Feasibility Studies and Rapid Prototyping, Proposal Preparation and Approval

   Phase II: Project Execution, culminating in Engineering Report, Oral Presentation, Poster and Demonstration

   Students are required to establish teams, research their topic, define the project objectives and specifications, write an engineering proposal, design the hardware and software, build appropriate schedules and budgets, manage a project through hardware implementation, testing and project closeout.

   Course Objectives:

   This course is designed to teach technical ideating and project defining, work breakdown structuring, establishment and execution of appropriate concept feasibility studies and bread-boarding, formal engineering proposal writing and obtaining project approval. Scheduling and budgeting are included in the proposal, project execution and management.

   Objectives (with corresponding ABET Criteria/outcomes):

   Ensure students:

   Learn how to establish and work in teams. (Criterion 3(d))
Appendix A -- Syllabi

Learn the concepts of Project Development Management. (Criterion 3(a),(b),(c),(e))

Apply the engineering concepts learned during the entire engineering academic curriculum to the design of a capstone project. (Criterion 3(c))

Define, implement and demonstrate an electrical or computer device or system of appropriate complexity to constitute a two-semester effort. (Criterion 3(c))

Develop good analytical and design skills. (Criterion 3(b))

Learn and use appropriate engineering approximations to simplify the analysis and design for practical implementation. (Criterion 3(b),(c),(e))

Gain experience in the proper use of electronic instruments as testing and diagnostic tools. (Criterion 3(a),(b),(c),(e))

Develop teamwork and good organizational skills associated with a successful project environment. (Criterion 3(a),(b),(c),(d),(e),(f),(g))

Learn to develop and present project schedules and budgets, and to make use of them in the tracking and reporting of project status during project execution. (Criterion 3(b),(c),(e),(g))

Learn to prepare and present project status reports and a project close out report. (Criterion 3(g),(h),(k))

7. Topics:

- Project Development & Management
Appendix B -- Faculty Vitae

Name: Wendell C. Bean, Ph.D., P.E.

Education:

Ph.D. Electrical Engineering, University of Pittsburgh, 1961
M.S. Electrical Engineering, University of Pittsburgh, 1958
B.S. Electrical Engineering, Lamar University, 1955
B.A. Mathematics Engineering, Lamar University, 1955

Academic Experience:
Lamar University, Beaumont, TX, Professor of Electrical Engineering, 1978-2012
Lamar University, Beaumont, TX, Professor and Head of Electrical Engineering, 1968-1978
University of Michigan, Ann Arbor MI, Senior Postdoctoral Research Fellow, 1967-1968; full time
Bettis Atomic Power Laboratory, Pittsburgh PA, Lecturer in Reactor Engineering School, 1961-1967; full time

Non-Academic Experience:
Gulf States Utilities Company in Beaumont, TX; Nuclear Engineering Consulting, 1970-1978; part time
Bettis Atomic Power Laboratory, Pittsburgh PA, Senior Engineer in Thermal and Hydraulic Design, 1955-1961; full time
Westinghouse Electric Corp, Sharon PA, Engineering Trainee in Distribution Transformer Design Section, 1954; full time

Certifications or Professional Registrations:
Texas Society of Professional Engineers (P.E. #40124 Nuclear Engineering); 1976-Present

Current membership in Professional Organizations:
Life Senior Member of IEEE
Member of Texas Society of Professional Engineers (P.E. #40124 TX)

Honors and Awards:
- IEEE Third Millennium Medal “for outstanding achievements and contributions”.
- Tau Beta Pi National Secretary’s Commendation for service as Director for District 10 region (TX-LA)
- Sigma Xi Research Society
- Eta Kappa Nu Honor Society
- Tau Beta Pi Honor Society

Service Activities:
Chief advisor for the Texas Zeta chapter of Tau Beta Pi (1980-present)
Distinguished Faculty Lecture Committee
Academic Integrity Committee
Judge Joe J. Fisher Lecture Series Committee
Advisor Board of Hospitality Apartments in Houston
Appendix B -- Faculty Vitae

**Principal Publications of last five years:**


**Professional Development Activities:**

Attended Faculty development Seminar, entitled “overteaching – when is less really more? By Dr. Robert K. Noyd, director of faculty development U.S. Air Force Academy”, Lamar University, March 23, 2011

Attended Faculty development Seminar, entitled the college fear factor “how students and professors misunderstand one another” by Rebecca D. Cox; Lamar University, Fall 2011
Appendix B -- Faculty Vitae

**Name:** G. N. Reddy

**Education:**

1. Ph.D., Signal Processing, Indian Institute of Technology, Madras, India, 1982
2. M.S., Biomedical Eng., Indian Institute of Technology, Madras, India, 1976
4. B.E., Electrical Engineering, JNT University, Hyderabad, India, 1972

**Academic Experience:**

Lamar University, Beaumont, TX, Associate Professor, 1995–present, Full-time
Lamar University, Beaumont, TX, Assistant Professor, 1990–1995, Full-time
Michigan Tech University, Houghton, MI, Assistant Professor, 1984–1989, Full-time

**Non-Academic Experience:**

1. LSU Medical Center, Shreveport, LA, Post-doctoral Fellow, 1981-1983, Full-time
2. Yale University, New Haven, CT, Post-doctoral Fellow 1979-1980, Full-time

**Certifications or Professional Registrations:**

**Current membership in Professional Organizations:**

IEEE

**Honors and Awards:**

**Service Activities:**

1. Faculty advisor for India Students Association, 2005-to-present


Conducted IEEE Seminars:

4. IEEE Seminar on “Plug-In America”, Cherry 2361, November 18, 2011
Appendix B -- Faculty Vitae

Principal Publications of last five years:

PUBLICATIONS:


PRESENTATIONS:


Professional Development Activities:

Recently attended workshops/Tutorials/Workshops/Educational Courses include:

1. Tutorial 1: Object oriented Modeling and Simulation of Electric and hybrid Electric Vehicles with Modelica, VPPC-2011, Chicago, IL, 9/6/2011; 8:30 am - 12:00 noon

2. Tutorial 3: Autonomie: Next Generation vehicle Software, VPPC-2011, Chicago, IL, 9/6/2011; 2:00 pm - 5:30 pm

3. Educational Short Course 1: Fundamentals of Electric Machines and Drives for Traction Applications, VPPC-2011, Chicago, IL, 9/7/2011; 2:00 pm - 5:30 pm

4. Educational Short Course 3: Smart Grid Charging and V2G, 9/8/2011, VPPC-2011, Chicago, IL, 9/8/2011; 2:00 pm - 5:30 pm

Appendix B -- Faculty Vitae

**Name:** Selahattin Sayil, Ph.D.

**Education:**
- B.Sc., Electronics, Gazi University, Ankara, TURKEY, 1990.

**Academic Experience:**
- Lamar University, Associate Professor, 2009-present, full time
- Lamar University, Assistant Professor, 2003-2009, full time
- Pamukkale University, Turkey, Assistant Professor and Department Chair, 2000-2003, full time

**Current membership in Professional Organizations:**
- Member of IEEE

**Principal Publications of last five years:**


Appendix B -- Faculty Vitae


Book Chapter Contribution:

“Advanced Circuits for Emerging Technologies”, Publisher: Wiley
Publication Date: May 2012 , ISBN-10: 0470900059

*Chapter 23 - Selahattin Sayil, Lamar University, Contactless Measurement and Testing Techniques”*

**Professional Development Activities:**

Attended the “National Science Foundation (NSF) one-day workshop” at Texas A&M University-Commerce on November 14, 2011.


Attended 2011 Nuclear and Space Radiation Effects (NSREC) Short Course, Denver, CO

Attended 2011 NSREC Conference, Denver, CO.

Attended 2011 NSREC Radiation Effects Data Workshop, Denver, CO.
Appendix B -- Faculty Vitae

Name: Ruhai Wang

Education:
Ph.D. in Electrical Engineering, New Mexico State Un., Las Cruces, NM, 2001
M.S. in Telecommunications, Roosevelt University, Chicago, IL, 1997
B.S. in Telecommunications, Tianjin Institute of Post & Telecom., China, 1991

Academic Experience:
(institution, rank, title, when[year to year], full time or part time)
Lamar University, Associate Professor, [2007-present], full time
Lamar University, Assistant Professor, [2002-2007], full time

Current Membership in Professional Organizations:
Member, IEEE Aerospace and Electronic Systems Society (AESS), 2007-Present
Member, IEEE Communications Society, 2003-Present

Honors and Awards:
Chair Professor, May 2011 - Present
Harbin Institute of Technology (HIT), China
(HIT: Member of the C9 League, an association of nine top Chinese universities)

Chair Professor, December 2009 - Present
Soochow University
Suzhou, China

Principal Publications of last five years (only the first author publication listed):


R. Wang, X. Wu, Q. Zhang, T. Taleb, Z. Zhang, and J. Hou, “Experimental evaluation of TCP-based DTN for cislunar communications in presence of long link disruption,” special issue on opportunistic
Appendix B -- Faculty Vitae


**R. Wang**, Bhuvan Modi, Qinyu Zhang, Jia Hou, Qing Guo and Ming-Chuan Yang, “Use of a Hybrid of DTN Convergence Layer Adapters (CLAs) in Interplanetary Internet,” In *Proc. of IEEE International Conference on Communications (ICC)*, June 2012.

**Professional Development Activities:**

**Editorship**

(1) Associate Editor, *IEEE Aerospace & Electronics Systems Magazine*, January 2012-Present

(2) Associate Editor, *Wiley InterScience’s Wireless Communications and Mobile Computing Journal*, Aug. 2006-2010

**TPC Chairs for Conferences/Workshops and Other Leadership**

(1) *IEEE International Conference on Communications (ICC)* 2007 Wireless Communications Symposium, the flagship conference of *IEEE Communications Society*, TPC co-chair.

Appendix B -- Faculty Vitae

Name: Gleb V. Tcheslavski

Education:
Engineer-Developer (BS+MS equivalent) in Electrical/Electronic Engineering Bauman Moscow State Technical University, Moscow, Russia, 1997

Academic Experience:
Lamar University, Beaumont, TX; Assistant Professor; 2008-Present; full time;
Lamar University, Beaumont, TX; Visiting Assistant Professor; 2007-2008, full time;
University of Houston, Houston, TX; Postdoctoral Fellow; 2006-2007; full time;
Virginia Tech, Blacksburg, VA; Graduate Teaching Assistant, 2002-2005, part time;
Virginia Tech, Blacksburg, VA; Research Assistant; 2002-2002; part time;
Virginia Tech, Blacksburg, VA; Graduate Research Assistant 2001-2002; part time;
Bauman Moscow State Technical University, Moscow, Russia; Teaching Assistant; 1995-1999; part time.

Non-Academic Experience:
State Reserve Committee, Moscow, Russia; Head of the Information Division (Developed a corporate information security system, was responsible for antivirus protection of the corporative network and individual computers, information security, and users’ education), 1998-1999, part time.

Certifications or Professional Registrations:

Current membership in Professional Organizations:
Member of IEEE
Member of IEEE Signal Processing Society

Honors and Awards:
Delta Beta Chapter of Eta Kappa Nu - Electrical Engineering honor society, 2009
Chair of the Beaumont section of IEEE, 2009
International travel fund grant from Graduate Student Association, Virginia Tech, 2005
Sigma Xi – The Scientific Research Society, 2001
The President’s Graduate Scholarship, Russia, 1996-1997

Service Activities:
Chair of the Beaumont section of IEEE;
Faculty Senate, Lamar University;
Distinguished Lecture Committee;
Appendix B -- Faculty Vitae

Academic Technology Committee,
COE Student-Faculty relation committee;
University Grievance Review Committee.

Principal Publications of last five years:


Professional Development Activities:

- Attended the “Transformation in Perilous Times: Navigating our Way through the 21st Century” – the Faculty Development Seminar at Lamar University on April 20, 2012.
- Organized and Attended the “Plug-in America” – IEEE Beaumont Section technical meeting at Lamar University on November 18, 2011.
- Organized and Attended the “on the design of MultiCopters” – IEEE Beaumont Section technical meeting at Lamar University on September 1, 2011.
- Organized and Attended the “Untapped potential of capacitors with asymmetry and Understanding mathematical models describing vibration based induction generators for energy harvesting” – IEEE Beaumont Section technical meeting at Lamar University on March 31, 2011.
Appendix B -- Faculty Vitae

Name:

Koji Hirano

Education:

- Doctoral student in Electrical Engineering, Lamar University, Beaumont, Texas; 2003 to Present.
- Master of Science degree in Mathematics concentrating in Statistics, University of Texas at San Antonio, San Antonio, Texas; 1996
- Master of Science degree in Computer Science, Florida Institute of Technology, Melbourne, Florida; 1988.
- Master of Engineering degree in System Engineering, Oita University, Oita, Japan; 1985.
- Bachelor of Engineering degree in System Engineering, Oita University, Oita, Japan; 1983.

Academic Experience:

- 2009 – present. Instructor for ELEN1100: “Introduction to Electrical Engineering”; Lamar University, Beaumont, TX.

Non-Academic Experience:


Certifications or Professional Registrations:

- N/A.

Current membership in Professional Organizations:

- 2007 – present. Member of IEEE.
Appendix B -- Faculty Vitae

Honors and Awards:

- Received “GTA of the Semester” award (Graduate Teaching Assistant) University of Central Florida, Fall 1997.

Service Activities:

- N/A.

Principal Publications of last five years:

- “A Visual Information Aided Multi-Media Ranking Technique”, Presentation at LSRO.

Professional Development Activities:

- Attended the “Plug-in America” – IEEE Beaumont Section technical meeting at Lamar University on November 18, 2011.
- Attended the “On the design of MultiCopters” – IEEE Beaumont Section technical meeting at Lamar University on September 1, 2011.
- Attended the “Untapped potential of capacitors with asymmetry and Understanding mathematical models describing vibration based induction generators for energy harvesting” – IEEE Beaumont Section technical meeting at Lamar University on March 31, 2011.
- Attended the “Who can be a Control or Instrumentation Engineer?” – IEEE Beaumont Section technical meeting at Lamar University on December 3, 2010.
- Attended the “How Electrical Engineers fit into the energy Industry” – IEEE Beaumont Section technical meeting at Lamar University on October 29, 2010.
- Attended the “Current State of Johnson Space Center” – IEEE Beaumont Section technical meeting at Lamar University on April 9, 2010.
- Attended the “Introduction to Microelectronic Packaging and Microsystems” – IEEE Beaumont Section technical meeting at Lamar University on October 29, 2009.
- Attended the “IEEE Student branch report” – IEEE Beaumont Section technical meeting at Lamar University on October 28, 2009.
- Attended the “Expansion of Internet into space and Interplanetary Internet” – IEEE Beaumont Section technical meeting at Lamar University on April 24, 2009.
Appendix B -- Faculty Vitae

Name: H. R. Myler

Education:
Ph.D. in Electrical Engineering, New Mexico State Un., Las Cruces, NM, 1985
M.S. in Electrical Engineering, New Mexico State Un., Las Cruces, NM, 1981
B.Sc. in Chemistry, Virginia Military Institute, Lexington, VA, 1975
(Double-Major in Electrical Engineering)

Academic Experience:
Lamar University, Beaumont, TX, Professor, 2001–present, Full-time
University of Central Florida, Orlando, FL, Professor, 1997–2001, Full-time
University of Central Florida, Orlando, FL, Associate Professor, 1991–1997, Full-time
University of Central Florida, Orlando, FL, Assistant Professor, 1986–1991, Full-time
New Mexico State Un., Las Cruces, NM, 1984–1985, Part-time

Non-Academic Experience:

Certifications or Professional Registrations:
Florida PE (by examination) Electrical Engineering Lic. 94001152
Texas PE Electrical Engineering Lic. 94458

Current membership in Professional Organizations:
IEEE

Honors and Awards:
William B. and Mary G. Mitchell Endowed Chair
Tau Beta Pi, Eta Kappa Nu
Fulbright Scholar

Principal Publications of last five years:
## Appendix C -- Equipment

<table>
<thead>
<tr>
<th>Room Designation</th>
<th>Location</th>
<th>Name &amp; Number of Units</th>
<th>Courses Supported</th>
</tr>
</thead>
</table>
| Sr. Design Lab         | C 1006   | 2 NI ELVIS II  
3 Optiplex 210 COMPUTERS  
2 INTEL DH67 CL            | ELEN 4102  
ELEN4207                   |
| Prototyping Facility   | C 1008   | 1 T-TECH CIRCUIT BOARD MILL  
1 2-CORP 3D PRINTER  
1 ROLAND 3D SCANNER  
1 INTEL 845 COMPUTER      | ELEN4207                   |
| Seminar Room           | C 1103   | 1 OVERHEAD PROJECTOR  
1 G4 MAC COMPUTER          | ELEN 4102                   |
| ECG Lab                | C 1108   | 1 E-VOKE SENSOR UNIT  
1 A.N.T.  
1 E P O C WIRELESS EEG AQUISITION  
1 ASA-40 EEG AQUISTION SYSTEM  
4 INTEL 965 COMPUTERS    | RESEARCH                   |
| Computer Lab           | C 1306   | 10 OPTIPLEX 210 COMPUTERS                                                              | ALL                        |
| Digital Lab            | C 1401   | 3 NI ELVIS I  
17 NI ELVIS II  
20 OPTIPLEX 980 COMPUTERS | ELEN 1100  
ELEN 2411  
ELEN 3108  
ELEN 3431  
ELEN 4486                   |
| ETAP Power Lab         | C 1403   | 5 LabVolt POWER CONSOLES  
5 TANGENT COMPUTERS       | ELEN 3441                   |
| Classroom              | C 1606   | 1 OVERHEAD PROJECTOR  
1 SHUTTLE COMPUTER        | ELEN 4304  
ELEN 5365  
ELEN 2310                   |
| SDR Lab                | C 2108   | 1 NI ELVIS I  
1 INTEL 915 COMPUTERS     | RESEARCH/DESIGN                          |
| Classroom              | C 2631   | 1 OVERHEAD PROJECTOR  
1 SHUTTLE COMPUTER        | ELEN 2411  
ELEN 3313  
ELEN 3322  
ELEN 3381  
ELEN 3441  
ELEN 4387  
ELEN 4304  
ELEN 5308  
ELEN 5328  
ELEN 5301                   |
| VLSI Lab               | C 2632   | 5 DELL 980 COMPUTERS                                                                  | ELEN 4304                   |
| Networks Lab           | C 2636   | 14 INTEL 945 COMPUTERS                                                                | RESEARCH                   |

C == Cherry Engineering Building
Appendix D -- Institutional Summary

1. The Institution

a. Name and address of the institution

   Lamar University
   P. O. Box 10001
   Beaumont, Texas 77710

b. Name and title of the chief executive officer of the institution

   Dr. James Simmons, President, Lamar University

c. Name and title of the person submitting the self-study report.

   Dr. Jack R. Hopper, Ph.D., P.E., Dean, College of Engineering

d. Name the organizations by which the institution is now accredited and the dates of the initial and most recent accreditation evaluations.

   The Commission on Colleges of the Southern Association of Colleges and Schools [1955] 2010
   Council for Education of the Deaf – 1999, next review 2015/16
   National League for Nursing Accrediting Commission-Graduate [2005], 2009, next visit Fall 2017
   National League for Nursing Accrediting Commission-Undergraduate & Associate [1984] 2001,
      (reaffirmed 2009), next visit Fall 2017
   American Dietetics Association – next visit 2013
   American Culinary Federation – next visit 2018
   ABET - CAC 2007, next visit Fall 2013
   ABET - EAC 2006, next visit Fall 2012
   National Association of Schools of Music – next review 2012/13

2. Type of Control

   State
3. Educational Unit

Following are organizational charts showing the position of the engineering unit within Lamar University, Academic Affairs; and for the College of Engineering and the Texas Centers for Technology Incubation (TCTI). The College of Engineering consists of the departments of Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering. Service functions reporting to the dean include the advising center, recruiting and co-op office, and engineering marketing. All engineering courses, programs and degrees are supervised by the above departments with engineering in their title.
Appendix D -- Institutional Summary

Chairs of the engineering education units are:

- College of Engineering – Jack Hopper, Ph.D., P.E., Dean
- Chemical Engineering – Thomas C. Ho, Ph.D., P.E., Chair
- Civil Engineering – Robert Yuan, Ph.D., P.E., Chair
- Electrical Engineering – Harley R. Myler, Ph.D., P.E., Chair
- Industrial Engineering – Brain Craig, Ph.D., P.E., C.P.E., Interim Chair
- Mechanical Engineering – Hsing-wei Chu, Ph.D., P.E., Chair

Directors of the service functions are:

- Advisement Center – Becky Caddy, Academic Advisor Senior
- Advisement Center – Paula Dunigan, Academic Advisor
- Recruiting and Co-op – Ronald Peevy, Director
- Engineering Marketing – Katrina Brent, Director

4. Academic Support Units

Chemistry and Biochemistry Department
Dr. Paul Bernazzani
Associate Professor and Chair of the Chemistry and Biochemistry Department
P.O. Box 10022 / Beaumont, TX 77710
409-880-8272
paul.bernazzani@lamar.edu

Computer Science Department
Dr. Larry Osborne
Professor and Chair of the Computer Science Department
P.O. Box 10056 / Beaumont, TX 77710
409-880-8775
cs@lamar.edu

Math Department
Dr. Mary E. Wilkinson
Associate Professor and Chair of the Math Department
P.O. Box 10047 / Beaumont, TX 77710
409-880-8792
marye.wilkinson@lamar.edu

Physics Department
Dr. George Irwin
Associate Professor and Interim Chair of the Physics Department
P.O. Box 10022 / Beaumont, TX 77710
409-880-7391
george.irwin@lamar.edu
Appendix D -- Institutional Summary

5. Non-academic Support Units

Career and Testing Center
Teresa Simpson, Director Career and Testing Center
PO Box, 10012 / Beaumont, TX 77710
409-880-8878
teresa.simpson@lamar.edu

College of Engineering Advisement Office
Becky Caddy, Academic Advisor Sr.
PO Box 10057 / Beaumont, TX 77710
409-880-8063
becky.caddy@lamar.edu

College of Engineering Cooperative Education Office
Ronald Peevy, Director of Cooperative Education and Recruiting
PO Box 10057 / Beaumont, TX 77710
409-880-7870
ronald.peevy@lamar.edu

Computing Center
Sean Stewart, Director – IT Computing Infrastructure
PO Box 10020 / Beaumont, TX 77710
409-880-8489
patrick.stewart@lamar.edu

Library Services
David Carroll, Director of Library Services
PO Box 10021 / Beaumont, TX 77710
409-880-8118
david.carroll@lamar.edu

Services for Students with Disabilities
Callie Trahan, Director for Students with Disabilities
PO Box 10087 / Beaumont, TX 77710
409-880-8026
callie.trahan@lamar.edu

Student Advising and Retention Services (STARS)
Dr. Sherri Shoefstall, Director for Student Advising and Retention Services
PO Box 10108 / Beaumont, TX 77710
409-880-7201
sherri.shoefstall@lamar.edu

Student Support Services
Andrea Stephenson, Director of Student Support Services
Appendix D -- Institutional Summary

PO Box 10007 / Beaumont, TX 77710
409-880-7923
andrea.stephenson@lamar.edu

Veteran’s Affairs
Norma Cumbaa, Coordinator Veteran’s Affairs
PO Box 10010 / Beaumont, TX 77710
409-880-8998
norma.cumbaa@lamar.edu

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**

### COLLEGE OF ENGINEERING

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>Total Undergrad</th>
<th>Total Grad</th>
<th>Associates</th>
<th>Bachelors</th>
<th>Masters</th>
<th>Doctorates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>FT</td>
<td>300</td>
<td>142</td>
<td>115</td>
<td>184</td>
<td>14</td>
<td>775</td>
<td>162</td>
<td>0</td>
<td>9</td>
<td>62</td>
</tr>
<tr>
<td>1</td>
<td>PT</td>
<td>19</td>
<td>19</td>
<td>17</td>
<td>64</td>
<td>7</td>
<td>121</td>
<td>114</td>
<td>0</td>
<td>114</td>
<td>191</td>
</tr>
<tr>
<td>2</td>
<td>2009</td>
<td>FT</td>
<td>281</td>
<td>138</td>
<td>121</td>
<td>232</td>
<td>15</td>
<td>787</td>
<td>384</td>
<td>0</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>14</td>
<td>13</td>
<td>15</td>
<td>40</td>
<td>7</td>
<td>89</td>
<td>126</td>
<td>0</td>
<td>88</td>
<td>206</td>
</tr>
<tr>
<td>3</td>
<td>2008</td>
<td>FT</td>
<td>238</td>
<td>124</td>
<td>118</td>
<td>209</td>
<td>7</td>
<td>696</td>
<td>305</td>
<td>0</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>34</td>
<td>6</td>
<td>17</td>
<td>54</td>
<td>10</td>
<td>101</td>
<td>131</td>
<td>0</td>
<td>88</td>
<td>206</td>
</tr>
<tr>
<td>4</td>
<td>2007</td>
<td>FT</td>
<td>228</td>
<td>133</td>
<td>94</td>
<td>187</td>
<td>6</td>
<td>648</td>
<td>214</td>
<td>0</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>8</td>
<td>12</td>
<td>23</td>
<td>43</td>
<td>10</td>
<td>97</td>
<td>81</td>
<td>0</td>
<td>67</td>
<td>146</td>
</tr>
</tbody>
</table>

### ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>Total Undergrad</th>
<th>Total Grad</th>
<th>Associates</th>
<th>Bachelors</th>
<th>Masters</th>
<th>Doctorates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>FT</td>
<td>62</td>
<td>25</td>
<td>28</td>
<td>36</td>
<td>1</td>
<td>152</td>
<td>26</td>
<td>0</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>1</td>
<td>PT</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>12</td>
<td>0</td>
<td>26</td>
<td>31</td>
<td>0</td>
<td>27</td>
<td>73</td>
</tr>
<tr>
<td>2</td>
<td>2009</td>
<td>FT</td>
<td>53</td>
<td>32</td>
<td>22</td>
<td>40</td>
<td>1</td>
<td>148</td>
<td>67</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>17</td>
<td>66</td>
<td>0</td>
<td>28</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>2008</td>
<td>FT</td>
<td>52</td>
<td>29</td>
<td>26</td>
<td>42</td>
<td>1</td>
<td>150</td>
<td>78</td>
<td>0</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>13</td>
<td>3</td>
<td>23</td>
<td>89</td>
<td>0</td>
<td>28</td>
<td>54</td>
</tr>
<tr>
<td>4</td>
<td>2007</td>
<td>FT</td>
<td>42</td>
<td>36</td>
<td>18</td>
<td>44</td>
<td>0</td>
<td>140</td>
<td>50</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>11</td>
<td>2</td>
<td>25</td>
<td>20</td>
<td>0</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

### CHEMICAL ENGINEERING

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>Total Undergrad</th>
<th>Total Grad</th>
<th>Associates</th>
<th>Bachelors</th>
<th>Masters</th>
<th>Doctorates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>FT</td>
<td>72</td>
<td>38</td>
<td>33</td>
<td>58</td>
<td>4</td>
<td>205</td>
<td>47</td>
<td>0</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>1</td>
<td>PT</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>17</td>
<td>1</td>
<td>23</td>
<td>35</td>
<td>0</td>
<td>27</td>
<td>43</td>
</tr>
<tr>
<td>2</td>
<td>2009</td>
<td>FT</td>
<td>58</td>
<td>28</td>
<td>36</td>
<td>49</td>
<td>4</td>
<td>175</td>
<td>70</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>17</td>
<td>2</td>
<td>27</td>
<td>37</td>
<td>0</td>
<td>27</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>2008</td>
<td>FT</td>
<td>60</td>
<td>33</td>
<td>26</td>
<td>55</td>
<td>5</td>
<td>179</td>
<td>95</td>
<td>0</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>17</td>
<td>0</td>
<td>25</td>
<td>21</td>
<td>0</td>
<td>22</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>2007</td>
<td>FT</td>
<td>59</td>
<td>28</td>
<td>25</td>
<td>55</td>
<td>2</td>
<td>169</td>
<td>79</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>15</td>
<td>3</td>
<td>25</td>
<td>31</td>
<td>0</td>
<td>23</td>
<td>46</td>
</tr>
</tbody>
</table>

| 500  | 9    | 14   | 38   | 4    | 22   | 0  | 14   | 38   | 4    |
Appendix D -- Institutional Summary

### CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>Total Undergrad</th>
<th>Total Grad</th>
<th>Associates</th>
<th>Bachelors</th>
<th>Masters</th>
<th>Doctorates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>FT</td>
<td>30</td>
<td>21</td>
<td>9</td>
<td>17</td>
<td>2</td>
<td>79</td>
<td>34</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>FT</td>
<td>40</td>
<td>17</td>
<td>28</td>
<td>18</td>
<td>1</td>
<td>104</td>
<td>37</td>
<td>0</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>15</td>
<td>17</td>
<td>0</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>FT</td>
<td>55</td>
<td>22</td>
<td>20</td>
<td>35</td>
<td>2</td>
<td>134</td>
<td>56</td>
<td>0</td>
<td>26</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>18</td>
<td>16</td>
<td>0</td>
<td>26</td>
<td>31</td>
</tr>
<tr>
<td>3</td>
<td>FT</td>
<td>34</td>
<td>16</td>
<td>20</td>
<td>35</td>
<td>0</td>
<td>105</td>
<td>61</td>
<td>0</td>
<td>8</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>2</td>
<td>21</td>
<td>10</td>
<td>0</td>
<td>8</td>
<td>44</td>
</tr>
<tr>
<td>4</td>
<td>FT</td>
<td>33</td>
<td>19</td>
<td>20</td>
<td>28</td>
<td>1</td>
<td>101</td>
<td>46</td>
<td>0</td>
<td>15</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>12</td>
<td>16</td>
<td>0</td>
<td>15</td>
<td>42</td>
</tr>
</tbody>
</table>

### INDUSTRIAL ENGINEERING

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>Total Undergrad</th>
<th>Total Grad</th>
<th>Associates</th>
<th>Bachelors</th>
<th>Masters</th>
<th>Doctorates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>FT</td>
<td>13</td>
<td>17</td>
<td>16</td>
<td>15</td>
<td>2</td>
<td>63</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>FT</td>
<td>27</td>
<td>21</td>
<td>27</td>
<td>7</td>
<td>0</td>
<td>113</td>
<td>47</td>
<td>0</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td>30</td>
<td>8</td>
<td>0</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>FT</td>
<td>15</td>
<td>9</td>
<td>27</td>
<td>1</td>
<td>0</td>
<td>66</td>
<td>32</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>7</td>
<td>9</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>FT</td>
<td>12</td>
<td>6</td>
<td>8</td>
<td>17</td>
<td>0</td>
<td>43</td>
<td>18</td>
<td>0</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td>11</td>
<td>0</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>FT</td>
<td>11</td>
<td>13</td>
<td>10</td>
<td>13</td>
<td>0</td>
<td>47</td>
<td>28</td>
<td>0</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>26</td>
</tr>
</tbody>
</table>

### MECHANICAL ENGINEERING

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>Total Undergrad</th>
<th>Total Grad</th>
<th>Associates</th>
<th>Bachelors</th>
<th>Masters</th>
<th>Doctorates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>FT</td>
<td>117</td>
<td>49</td>
<td>29</td>
<td>58</td>
<td>5</td>
<td>249</td>
<td>29</td>
<td>0</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>9</td>
<td>4</td>
<td>6</td>
<td>27</td>
<td>4</td>
<td>50</td>
<td>24</td>
<td>0</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>1</td>
<td>FT</td>
<td>93</td>
<td>34</td>
<td>39</td>
<td>60</td>
<td>2</td>
<td>228</td>
<td>62</td>
<td>0</td>
<td>36</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>22</td>
<td>29</td>
<td>0</td>
<td>36</td>
<td>28</td>
</tr>
<tr>
<td>2</td>
<td>FT</td>
<td>73</td>
<td>39</td>
<td>41</td>
<td>72</td>
<td>2</td>
<td>227</td>
<td>58</td>
<td>0</td>
<td>32</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>18</td>
<td>30</td>
<td>0</td>
<td>32</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>FT</td>
<td>66</td>
<td>43</td>
<td>29</td>
<td>60</td>
<td>3</td>
<td>211</td>
<td>69</td>
<td>0</td>
<td>27</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>11</td>
<td>0</td>
<td>17</td>
<td>10</td>
<td>0</td>
<td>27</td>
<td>46</td>
</tr>
<tr>
<td>4</td>
<td>FT</td>
<td>75</td>
<td>41</td>
<td>19</td>
<td>51</td>
<td>3</td>
<td>189</td>
<td>37</td>
<td>0</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>PT</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>20</td>
<td>1</td>
<td>35</td>
<td>19</td>
<td>0</td>
<td>17</td>
<td>24</td>
</tr>
</tbody>
</table>
Signature Attesting to Compliance

By signing below, I attest to the following:

That Electrical Engineering 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 Programs to include the General Criteria and any applicable Program Criteria, and the ABET Accreditation Policy and Procedure Manual.

____________________________________________________________________
Jack R. Hopper, P.E., Ph.D.
Dean College of Engineering

____________________________________________________________________
Signature                                           Date