PROGRAM PERFORMANCE REVIEW

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

Self-Study Report

Submitted by:

Mostafa (Mo) Shiva, Chair

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Self-Study Report
Electrical Engineering Department
California State University, Fullerton

A. Background Information

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2. Program History

The **Bachelor of Science (BS) degree in Electrical Engineering (EE)** is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 347-7700. The Electrical Engineering program provides the undergraduate students with knowledge of basic and advanced topics in the areas of design and analysis of VLSI and electronic circuits, design and analysis of computer architecture, microprocessors, communication systems, signal processing, and control systems. Through this program students develop an ability to apply design and analysis knowledge to the practice of electrical engineering in an effective and professional manner. This knowledge can be applied to various engineering practices in aerospace, computer, electrical, electronics and other applied fields. Our most recent ABET visit was in 2008 and the Department received the best possible rating of NGR (Next General Review). The BS program consists of 129 units, 14 of which are technical electives. The Degree Title is: Bachelor of Science in Electrical Engineering. Students can concentrate in one of the following areas of specialization:

- Communication and Signal Processing
- Computer Engineering and Computer Networks
- Robotics and Control Systems

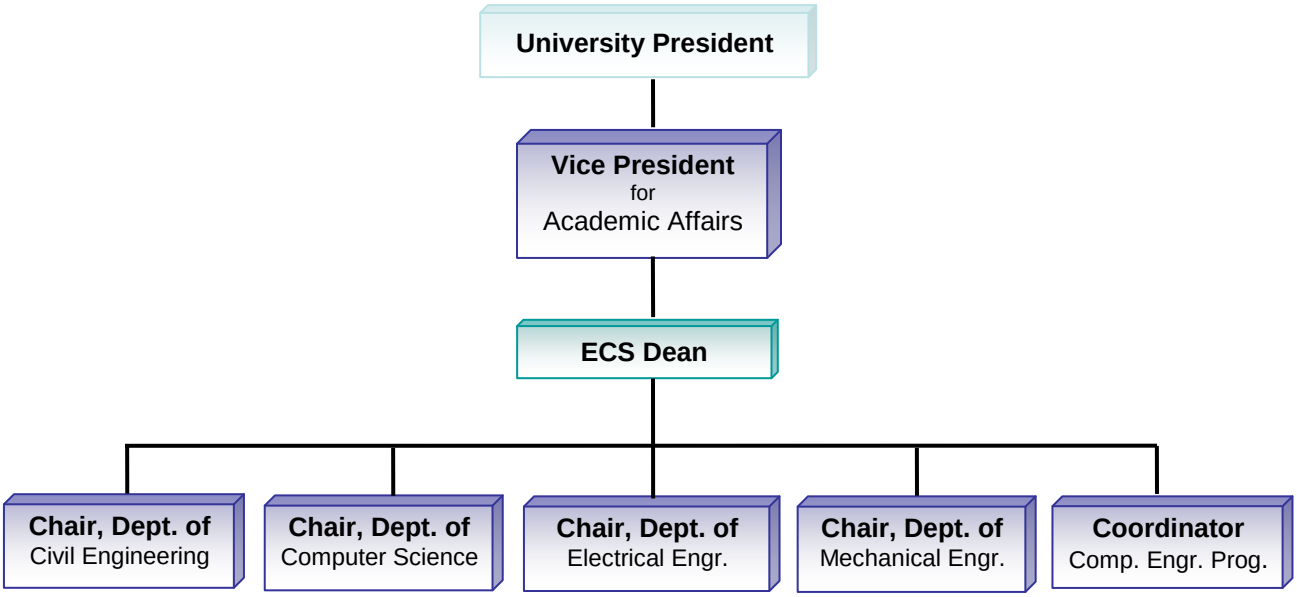
- VLSI and Electronics Circuits

The self-study (ABET) report of the BS program is available upon request.

The **Master of Science (MS) Degree in Electrical Engineering** is the program included in this self-study. Master students take a combination of 400-level and 500-level courses. Enrollment in 500-level courses is limited to graduate students only. 400-level courses can be taken by graduate students as well as junior/senior undergraduate students who take some of the 400-level courses as Technical Electives. Assessment of 400-level courses is a part of the department's review for ABET. As such they will not be included in this self-study; however, we will refer to the results of assessment of these courses done for ABET in this report.

3. Organizational Structure

Following is a very brief chart showing the organizational structure of the College of Engineering and Computer Science in the University:



B. Self-study Elements for the MSEE Degree

I. Department Mission, Goals and Environment

A. Department Mission and goals

The mission of the EE Department is consistent with the college mission stating that "The mission of the College of Engineering and Computer Science is congruent with those of the individual programs. At one level, being a state university, its mission is the creation of an educated and competitive workforce for the State of California. At another level, its mission is to educate engineers and computer scientists who will have state-of-the-art knowledge at the time of graduation, and will be well-equipped to seek and secure higher education as necessary."

The Department has the following goals:

A. Technical Growth: Graduates will be successful in modern engineering practice, integrate into the local and global workforce, and contribute to the economy of California and the nation.

B. Professional Skills: Graduates will continue to demonstrate the professional skills necessary to be competent employees, assume leadership roles, and have career success and satisfaction.

C. Professional Attitude and Citizenship: Graduates will become productive citizens with high ethical and professional standards, who make sound engineering or managerial decisions, and have enthusiasm for the profession and professional growth.

These goals are designed to implement the University's Mission, Goals, and Strategies in several ways. Specifically, they address the following University Goals and Strategies:

Goals & Strategies

I. To ensure the preeminence of learning, we will:

- Establish an environment where learning and the creation of knowledge are central to everything we do.
- Integrate teaching, scholarly and creative activities, and the exchange of ideas.
- Recruit and retain a highly-qualified and diverse staff and faculty.

- Develop and maintain attractive, accessible, and functional facilities that support learning.
- Integrate advances in information technologies into learning environments.

II. To provide high quality programs that meet the evolving needs of our students, community, and region, we will:

- Support undergraduate and graduate programs in professional and pre-professional studies and in the arts and sciences.
- Integrate knowledge with the development of values, professional ethics, and the teamwork, leadership, and citizenship skills necessary for students to make meaningful contributions to society.
- Offer continuing education programs that provide retraining and meet professional certification and other community needs.
- Provide opportunities to learn from external communities through internships, cooperative education, and other field activities.

III. To enhance scholarly and creative activity, we will:

- Support faculty research and grant activity that leads to the generation, integration and dissemination of knowledge.
- Encourage departments to reconsider the nature and kinds of scholarship within the discipline and to create a culture conducive to scholarly and creative activity.
- Encourage departments to implement a plan and personnel document supportive of scholarly and creative activities consistent with collegial governance and the university's mission and goals.
- Cultivate student and staff involvement in faculty scholarly and creative activity.
- Provide students, faculty, and staff access to and training in the use of advanced technologies supportive of research, scholarly, and creative activity.

IV. To make collaboration integral to our activities, we will:

- Create opportunities in and out of the classroom for collaborative activities for students, faculty, and staff.
- Encourage, recognize, and reward interdisciplinary and cross-unit collaboration.

V. To create an environment where all students have the opportunity to succeed, we will:

- Develop an innovative outreach and simplified admissions system that enhances recruitment of qualified students.
- Ensure that students of varying age, ethnicity, culture, academic experience, and economic circumstances are well served.

- Facilitate a timely graduation through class availability and effective retention, advisement, career counseling, and mentoring.
- Provide an affordable education without sacrificing quality.
- Provide an accessible, attractive and safe environment, and a welcoming campus climate.

VII. To expand connections and partnerships with our region, we will:

- Develop mutually beneficial working partnerships with public and private sectors within our region.
- Involve alumni as valued participants in the on-going life of the university

VIII. To strengthen institutional effectiveness, collegial governance and our sense of community, we will:

- Ensure our reward systems are compatible with our mission and goals by reviewing the multiple roles of faculty and staff through the various stages of their careers.
- Integrate advances in information and communication technologies into work environments.
- Enhance a sense of community to ensure that faculty, students, and staff have as a common purpose the achievement of the overall goals of the University.

B. Changes and trends in the discipline and the Department Response

Electrical Engineering is one of the fastest expanding and growing fields. Some of the most rapid advances and developments in industry during the past several years have been in areas of Digital Communications, Digital signal Processing, Digital Control and Robotics, Radio Frequency (RF), and Power generation/conservation. Our program has been strong in covering most of these areas.

Due to the recent needs of the industry and changes in the environment, RF and Power areas have been among those that need more development. In response to the industry and environmental changes, the MSEE program has developed two new courses in the RF area, namely EGEE-435, Microwave Engineering, and EGEE 469, Antennas for Wireless Communication. We are considering addition of some graduate level power courses to the curriculum; however, due to the recent budget cuts, the implementation of this task, which may need employment of new faculty, is becoming more and more challenging.

C. Department's Priorities for the Future

Our main priority for the program is to maintain our high standards and quality of education. Our graduates are well-accepted and desired by the local, as well as national, industry. Many of them are employed by the local large companies and many of the local smaller companies. Our program also attracts a very large number of international students.

Among other priorities, we will continue to assess the program and apply improvements, as needed. We will monitor market trends and the new industry needs to act in a timely manner and make necessary curriculum changes. We will continue to further increase our enrollment. We will continue to encourage projects and research by our faculty and/or students and will facilitate it by providing the state-of-the-art equipment.

Our current faculty members have excellent theoretical and practical knowledge of the subjects they teach. However, we will try to augment our faculty by new members in the new advancing areas. We have employed two new faculty members in the past few years, and will try to employ at least two more.

We use the feedback from our constituencies for review, assessment, and improvement of the program. They include our faculty, Industrial Advisory Board, our alumni and their employers, and colleagues in other universities.

II. Department Description and Analysis

A. Substantial Curricular Changes since the Last Program Review

The graduate degree program has not been under any formal review in the past. The current assessment is the first review of the program. However, we informally review our program on continuous bases. The addition of two new courses is among the recent curricular changes in the Department. This was done due to the industry's recent demand for graduates with expertise in the RF area.

B. Structure of the Degree (Program Description)

The MSEE degree consists of a 30-unit coursework (10 courses) to be completed in one of the five available areas of concentration. At least 15 units should consist of 500-level courses.

A student is required to select a minimum of 15 units within the concentration. These 15 units may be 400- or 500-level courses in one of the following areas

of concentrations:

Communications Systems/Signal Processing

EGEE 416	Feedback Control Systems (3)
EGEE 420	Introduction to Digital Filtering (3)
EGEE 435	Microwave Engineering (3)
EGEE 442	Electronic Circuits (3)
EGEE 443	Electronic Communication Systems (3)
EGEE 460	Introduction to Cellular Mobile Communication Systems (3)
EGEE 469	Antennas for Wireless Communications (3)
EGEE 480	Optical Engineering and Communications (3)
EGEE 483	Introduction to Global Positioning System (GPS) (3)
EGEE 483L	Global Positioning System Lab (2)
EGEE 503	Information Theory and Coding (3)
EGEE 507	Detection Theory (3)
EGEE 510	Optics & Electromagnetics in Communication (3)
EGEE 518	Digital Signal Processing (3)
EGEE 522	Spread Spectrum Communications (3)
EGEE 529	Principles of Neural Systems (3)
EGEE 531	Phase-Locked and Frequency Feedback Systems (3)
EGEE 537	Satellite Communications (3)
EGEE 570	Seminar in Electrical Engineering (1-3)
EGEE 580	Analysis of Random Signals (3)
EGEE 581	Theory of Linear Systems (3)
EGEE 582	Linear Estimation Theory (3)

Computer Engineering

EGEE 404	Introduction to Microprocessors (3)
EGEE 404L	Microprocessor Laboratory (1)
EGEE 406	Design Applications with Microcontroller and FPGA (3)
EGEE 407	Digital Computer Architecture and Design I (3)
EGEE 407L	Digital Computer Design Laboratory (3)
EGEE 412	Computer Architecture (3)
EGEE 424	Computer Simulation of Continuous Systems (3)
EGEE 445	Digital Electronics (3)
EGEE 448	Digital Systems Design (3)
EGEE 465	Introduction to VLSI Design (3)
EGEE 519A	Hypercube Multiprocessing & Applications (3)
EGEE 519B	Multiprocessing and Computer Networks (3)
EGEE 527	Fault Diagnosis and Fault-Tolerant Design (3)
EGEE 529	Principles of Neural Systems (3)
EGEE 557	Microprogramming and Embedded Microprocessors (3)

EGEE 558A,B Microprocessors and System Applications I and II (3,3)
EGEE 559 Robotics (3)
EGEE 570 Seminar in Electrical Engineering (1-3)

Control Systems

EGEE 409 Introduction to Linear Systems (3)
EGEE 416 Feedback Control Systems (3)
EGEE 420 Introduction to Digital Filtering (3)
EGEE 483 Introduction to Global Positioning System (GPS) (3)
EGEE 483L Global Positioning System Lab (2)
EGEE 504A Linear Network Synthesis (3)
EGEE 526 Digital Control Systems (3)
EGEE 529 Principles of Neural Systems
EGEE 559 Robotics (3)
EGEE 580 Analysis of Random Signals (3)
EGEE 581 Theory of Linear Systems (3)
EGEE 582 Linear Estimation Theory (3)
EGEE 585 Optimization Techniques in Systems Engineering (3)
EGEE 587 Operational Analysis Techniques in Systems Engineering (3)

Electronics and Circuit Theory

EGEE 420 Introduction to Digital Filtering (3)
EGEE 435 Microwave Engineering (3)
EGEE 442 Electronic Circuits (3)
EGEE 445 Digital Electronics (3)
EGEE 455 Microelectronics and Nano Devices (3)
EGEE 465 Introduction to VLSI Design (3)
EGEE 469 Antennas for Wireless Communications (3)
EGEE 504A Linear Network Synthesis (3)
EGEE 510 Optics & Electromagnetics in Communication (3)
EGEE 520 VLSI Architectures for Signal Processing (3)
EGEE 523A VLSI and Nano Technology and Devices (3)
EGEE 523B CMOS VLSI Design (3)
EGEE 557 Microprogramming and Emulation (3)
EGEE 558A,B Microprocessors & Systems Applications (3,3)
EGEE 570 Seminar in Electrical Engineering (1-3)

Systems Engineering

EGEE 409 Introduction to Linear Systems (3)
EGEE 416 Feedback Control Systems (3)
EGEE 424 Computer Simulation of Continuous Systems (3)

EGEE 425	Introduction to Systems Engineering (3)
EGEE 483	Introduction to Global Positioning System (3)
EGEE 483L	Global Positioning System Lab (2)
EGEE 529	Principles of Neural Systems
EGEE 570	Seminar in Electrical Engineering (1-3)
EGEE 580*	Analysis of Random Signals (3)
EGEE 581*	Theory of Linear Systems (3)
EGEE 582*	Linear Estimation Theory (3)
EGEE 585*	Optimization Techniques in Systems Engineering (3)
EGEE 587*	Operational Analysis Techniques in Systems Engineering (3)
EGEE 588	Systems Engineering Process and its Management (3)

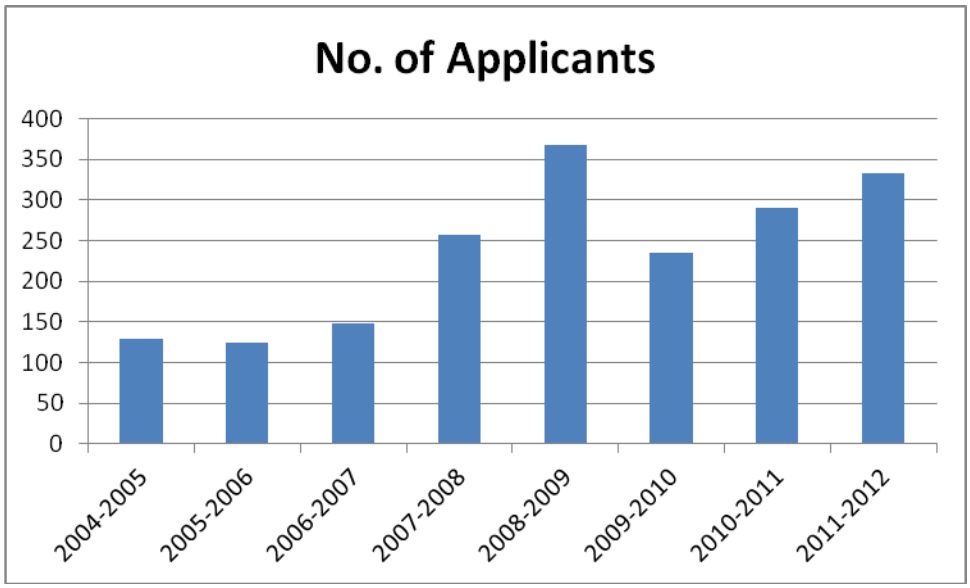
* Students selecting the systems engineering option will be required to include these five (5) courses in their study plan.

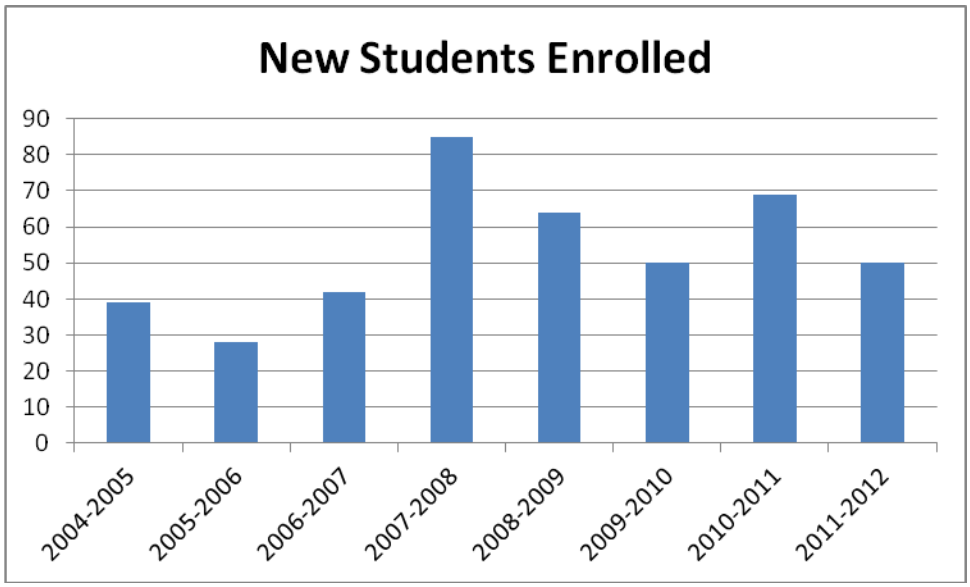
The Systems Engineering concentration area is formally an option. Students are to take the five required courses highlighted above, and the MS degree will show the concentration area. Students also have the choice of taking some adviser approved management courses.

Additionally, independent of the area of concentration, all students are required to take two math based courses: EGGN-403, Numerical Analysis, and EGEE 580, Analysis of Random Signals. For the students who have taken EGGN-403 as a technical elective, EGEE-518, Digital Signal Processing replaces EGGN-403.

C. Student Demand for the MSEE Offerings

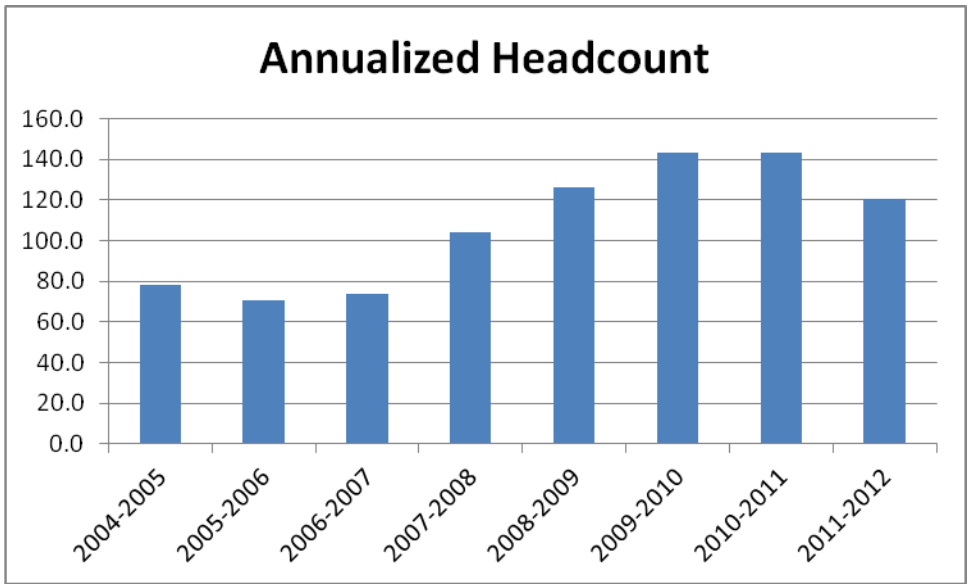
As seen from the graphs below (data available in Appendix 2, Table 5), there has been a large increase in the number of applicants since 2007. The number has also consistently increased in the past three years. Approximately 65 percent of the applicants get accepted, the rest are rejected due to incomplete applications, or lack of qualifications to meet the department standards. Including the international students, we get approximately fifty new students every year.





Headcount for the MSEE program, shown in the graph below (data available in Appendix 2, Table 6B) has been consistently increasing over the past several years, except for a small drop in 2011-12. As a result, class sizes that were historically limited by a maximum of thirty (30) students have constantly increased in the past few semesters. Currently, we have several classes with enrollments of forty to sixty students. Although this problem is partly because of the budget cuts in recent years, to keep the traditional high quality of education that our department is known for, we need to employ new faculty members to reduce the class sizes and to be competitive in the ever expanding areas of electrical engineering.

About 33% of the graduate students complete the degree requirements in two years; however, the majority of our students work while going to school. As such, it takes over four years for 67% of them to complete their degree requirements.



D. Enrollment Trends since the Last Program Review

This is our first review of the program. However, as stated in the previous section, there is an urgent need for new faculty members in the program. The number of faculty, which was sixteen (16) just a few years ago, has reduced to twelve (12) due to several members retiring. While at the same time, number of graduate students has increased significantly.

E. Short and Long Term Plans for Curricular Changes

Our curriculum is continuously monitored by our own reviews and inputs received from our constituencies. High quality of the program is well known and our graduates are in high demand, especially by the local industry. We consider the demands of the industry and modify our existing courses, and offer new courses as needed. Currently, we do not have any major plan for substantial changes in the curriculum; however, to remain competitive, we need to employ new faculty so as to expand our program in the recently popular areas of electrical engineering applications, such as Communications, RF, and Power.

F. Special Sessions and Self-Support Programs

The department does not have any Special Sessions or Self-Support programs.

III. Documentation of Student Academic Achievement and Assessment of Student Learning Outcome

A. Student Learning Goals

The department goal for student learning is to prepare them for long-term achievement of the department educational goals. The students' preparation is measured by a set of Student Learning outcomes. As specified in section B.I, the **Department has the following goals:**

A. Technical Growth: Graduates will be successful in modern engineering practice, integrate into the local and global workforce, and contribute to the economy of California and the nation.

B. Professional Skills: Graduates will continue to demonstrate the professional skills necessary to be competent employees, assume leadership roles, and have career success and satisfaction.

C. Professional Attitude and Citizenship: Graduates will become productive citizens with high ethical and professional standards, who make sound engineering or managerial decisions, and have enthusiasm for the profession and professional growth.

These goals are set for both undergraduate and graduate programs. To reach our goals, a set of Student Learning Outcomes (SLOs) have been developed. SLOs are used to assess the student learning and to prepare them to successfully satisfy the long term goals.

A.1 Undergraduate Student Learning Outcomes

The undergraduate SLOs, listed below, are set by ABET, the accreditation agency for the undergraduate program. These SLOs are also used for 400-level courses taken by our graduate students.

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 multi-disciplinary 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.

This set of SLOs is practically used by all universities accredited by ABET.

A.2 Graduate Student Learning Outcomes

The graduate SLOs are set by the department and are as follows:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
3. Ability to integrate into the local and global workforce
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
5. Ability to assume leadership roles
6. Ability to communicate effectively by using written, oral, and electronic methods

As stated before, the MSEE degree consists of a 30-unit coursework (10 courses) to be completed in one of the five available areas of concentration. A student is required to select a minimum of 15 units within the concentration. The set of ten courses consists of a combination of 400-level and 500-level courses and at least half of the courses should be 500-level. Enrollment in 500-level courses is limited to graduate students only. 400-level courses can be taken by graduate students as well as junior/senior undergraduate students, who take some of the 400- courses as Technical Electives.

Assessment of 400-level courses is a part of the department's review for ABET. As such they will not be included in this self-study; however, we will refer to the results of assessment of these courses done for ABET in this report.

The above six SLOs, which are assigned to the assessment of the 500-level courses, are related to the department goals as follows:

A. Technical Growth: Graduates will be successful in modern engineering practice, integrate into the local and global workforce, and contribute to the economy of California and the nation.

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
3. Ability to integrate into the local and global workforce

B. Professional Skills: Graduates will continue to demonstrate the professional skills necessary to be competent employees, assume leadership roles, and have career success and satisfaction.

4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
5. Ability to assume leadership roles
6. Ability to communicate effectively by using written, oral, and electronic methods

C. Professional Attitude and Citizenship: Graduates will become productive citizens with high ethical and professional standards, who make sound engineering or managerial decisions, and have enthusiasm for the profession and professional growth.

<u>This goal is satisfied by assessment of 400-level courses under ABET requirements</u>

B. Assessment for Student Learning

Tools and methods used for assessing SLOs vary from course to course. Generally, they include homework assignments, examinations, project reports and presentations, and the final oral exams, theses, or projects.

Each learning goal is met by one or more courses and is assessed by one or more assessment strategies and methods. The following assessment matrix illustrates a list of EE 500-level courses and their related SLOs:

The results of the current assessment cycle are shown in Appendix 6.

Table III.B.1 Relation of 500-Level Courses to SLOs

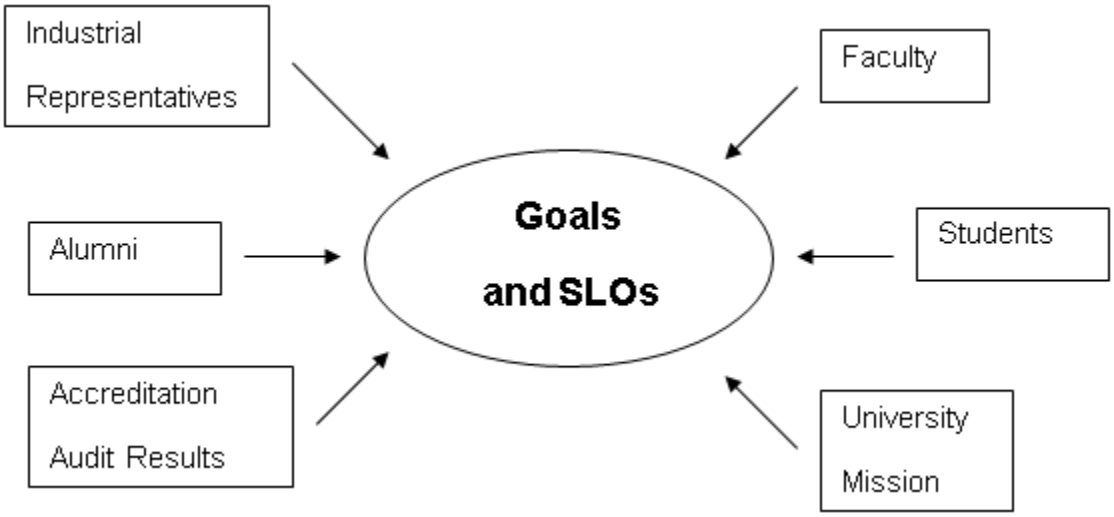
Course No.	Course	PPR SLOs
EGEE 503	Information Theory and Coding	1, 2, 4, 6
EGEE 504A	Linear Network Synthesis	1, 2, 4
EGEE 507	Detection Theory	1, 4, 6
EGEE 510	Optics & Electromagnetics in Communication	1, 2, 3, 4, 6
EGEE 518	Digital Signal Processing	1, 2, 6
EGEE 519A	Parallel and Multiprocessing	1, 2, 4
EGEE 519B	Computer Networks and the Internet	1, 2, 4
EGEE 522	Spread Spectrum Communications	1, 2, 4
EGEE 523A	VLSI and Nanotechnology and Devices	1, 2, 3, 4
EGEE 523B	CMOS VLSI Design	2, 4, 6
EGEE 526	Digital Control Systems	1, 2, 4
EGEE 527	Fault Diagnosis and Fault-Tolerant	1, 2, 4
EGEE 529	Principles of Neural Systems	1, 2, 4
EGEE 531	Phase-Locked and Frequency Feedback Systems	1, 2, 4
EGEE 537	Satellite Communications	1, 2, 3, 4, 6
EGEE 557	Microprogramming and Embedded	1, 2, 4
EGEE 558A	Microprocessors & Systems Applications I	1, 2, 4
EGEE 558B	Microprocessors and Systems Applications II	1, 2, 4
EGEE 559	Introduction to Robotics	1, 2, 4
EGEE 580	Analysis of Random	1, 2, 4
EGEE 581	Theory of Linear Systems	1, 2, 3, 4
EGEE 582	Linear Estimation Theory	1, 2, 4
EGEE 585	Optimization Techniques in Systems	1, 2, 4
EGEE 587	Operational Analysis Techniques in Systems	1, 2, 4, 5
EGEE 588	Systems Engineering Process & its Management	1, 2, 4
EGEE 597	Project	Vary
EGEE 598	Thesis	Vary
EGEE 599	Independent Graduate Research	Vary

C. Are the assessment strategies/measures of the program changing over time?

Once every three years, revision of the SLOs and assessment strategies is initiated by the Assessment Committee of the Department. The committee consists of three elected faculty members. The committee collects the feedback from our constituencies for review, assessment, and improvement of the program. The constituencies include our faculty, Industrial Advisory Board, our alumni and their employers, and colleagues in other universitiesAny

Suggested revisions are presented to the EE faculty, Industrial Advisory Board, and Student Clubs' Officers. If the feedback for the revisions are favorable, the EE faculty will approve them.

Significant Constituencies of the Program



D. Modifications to the program to enhance student learning?

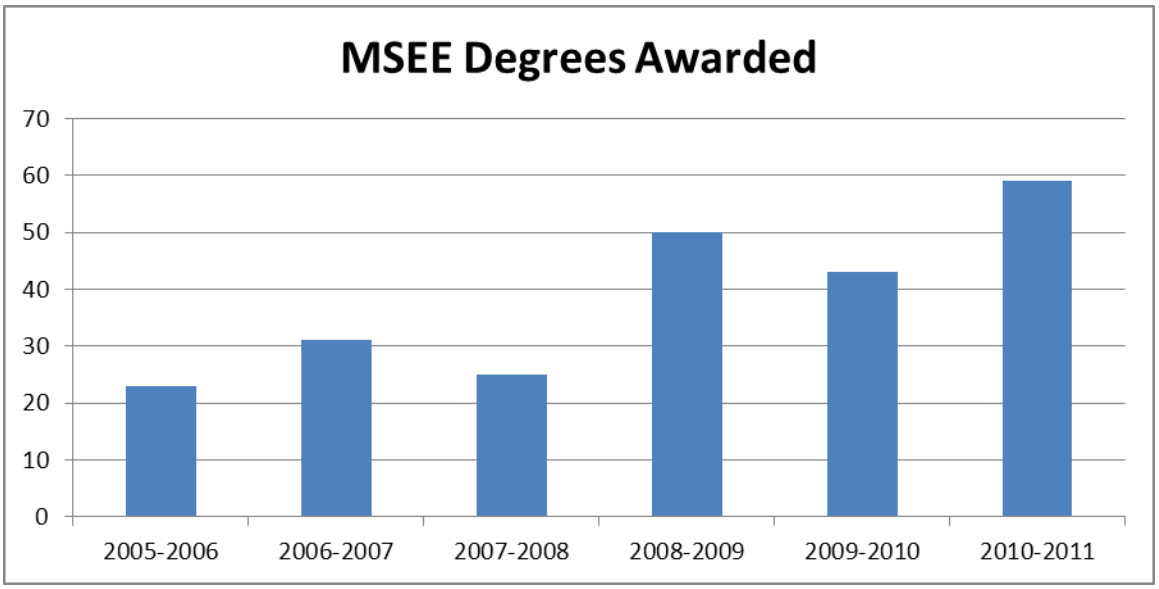
The surveys and assessments of the undergraduate program, the surveys of our alumni, the informal surveys of our graduate students, and surveys of employers of our graduates indicate a high rate of satisfaction by the graduates of the program as well as the local industry's' desirability for our graduates as their future employees (See Appendix 6). However, in our on-going efforts to continuously improve the program, we will scrutinize the results of the assessments of our MSEE degree to find places for improvements.

E. Improvements Resulting from the Assessment Process

Although we continuously monitor and improve our curriculum, this is our first attempt in a formal assessment of our MSEE degree. We hope to get some constructive feedback and use it to complement our standard program improvements.

F. Quality Indicators

Assessment of Student Learning Outcomes; Surveys of our Alumni and Their Employers; Inputs from our Advisory Board, Number of MSEE Degrees Awarded (See the plot below); and Student-Faculty collaborations on Directed Studies, Master's Projects, Oral Exams, and Theses; are among quality indicators. **Quality Indicators and Documentation of Academic Achievement resulting from our assessments of Goals and Student Learning Outcomes (SLOs), using both Direct and Indirect assessments, are listed in Appendix 6**.



G. On-line or Video Conferencing Assessment

The EE Department is not currently offering any distance courses.

IV. Faculty

A. Changes in Full-Time Equivalent Faculty (FTEF) since the last review

There are twelve (12) tenured and tenure-track faculty members in the department of Electrical Engineering, of which two are in FERP program. All have advanced academic degrees (11 Ph.D. and 1 equivalent doctorate degree). Most have extensive industrial experience, obtained through previous employments, part-time employments and consulting.

Ten faculty members are tenured full professors and two are assistant professors. The size of the faculty has gone down in the past several years because the retiring faculty have not been replaced equivalently. MS in Electrical Engineering is a major based degree; covering all important aspects of the field without hiring new faculty has become very difficult.

The teaching load is 12 credit hours. The faculty members are also required to hold a minimum of four office hours every week to meet with students. They also attend the Department's faculty meetings and participate in Department, College, and University committees. The total average load is around 15-19 credit hours per week, depending on the lecture/lab mixture of the teaching assignments and the committee services. Time is also spent on lecture preparation and professional development.

The Department also employs part-time lecturers as needed. Part-time lecturers are chosen from a pool of available teachers with different backgrounds and teaching experiences. New lecturers are screened and added to the pool once in a while. All of the part-time lecturers are working engineers and professionals.

On the negative side, the department chair is an academic year chair. As such, the department is left without leadership, and practically most department functions are hauled during semester breaks, and especially during the summer breaks.

B Priorities for Additional Faculty Hires

The class sizes have been ever increasing in the past few years. The retiring faculty members have created lack of expertise in their areas of expertise. In addition, since Electrical Engineering is rapidly expanding in several areas, there is an urgent need for new hires. If and when new hiring is approved, priority will be mainly given to the expertise in the needed areas.

As can be seen from the new products and technology that hit the market on daily basis, the discipline is rapidly advancing and changing. To meet the career objectives of students, the university, and regional, national and global developments, employment of new faculty is essential..

C. Role of Faculty in the Department's Curriculum Offerings

Faculty is fully involved in development of the department's curriculum. After reviewing the inputs received from our constituencies, the final curriculum modifications and enhancements are decided by the faculty. We have used

very few part-time instructors in the past few years. Most of the curriculum is taught by the full-time faculty.

D. Instructor Participation in Special Sessions Self-Support Programs

Currently, the department does not have any Special Sessions or Self-Support program.

V. Student Support and Advising

A Student Advising

The initial student advisement is done during the student orientation. During the orientation, the ECS College provides general information to the students, and that is followed by major advisement by the department chair.

Next, before the first semester registration, each student is advised either by the department graduate adviser, or the chair. During this formal advisement, students choose an area of concentration for their MSEE program, and are assigned a permanent faculty adviser who is specialized in their areas of interest. Next, sometime during their first semester, students meet with their permanent adviser to set up their Study Plan, i.e., the set of ten courses that they will take to complete the degree requirements. Students further meet with their advisers during the course of their studies (usually once a semester) for monitoring their progress and possible modifications of their Study Plans.

In each advising session, the adviser writes a summary of the discussion, and lays out the coursework for the next semester. A copy of the advisement sheet is given to the student and another one is placed in his/her file.

B Students Participate in Honors Programs and Research with Faculty

The Department encourages students to participate in nation-wide honors programs such as Tau Beta Pi, and Student clubs such as Institute of Electronics and Electrical Engineering (IEEE) and Instrumentation, Systems, and Automation Society (ISA). Both, undergraduate and graduate students, are also encouraged to work with faculty by participating in research projects and directed studies.

Some of the graduate students and faculty research projects result in significant outcomes that are submitted for exhibitions and publications. Below is a list of some recent outcomes of the collaborative research between the students and faculty:

- "The CSUF Autonomous Lawnmower: Lessons learned from Modifying an Existing Lawnmower," J. Huang, M. Yeh, ION International Technical Meeting 2012, Newport Beach, CA, Jan 2012
- J. Costantine, Y. Tawk, J. Himmelheber, M. Shiva, and C. G. Christodoulou, "A cognitive radio planar antenna system with a reconfigurable substrate height," IEEE URSI National Radio Science Meeting, Jan. 2012.
- J. Costantine, Y. Tawk, S. Moth, C. G. Christodoulou, and S. E. Barbin, "A modified helical shaped deployable antenna for cubesat," submitted to the IEEE-APS Topical Conference on Antennas and Propagation in Wireless Communications, Sept. 2012.
- Our robotic lawnmower team won the 1st place with $2500 cash prize at the static competition in the 9th Annual Robotic Lawnmower Competition, held at Dayton, Ohio from May 31 to Jun 2. In addition, we also received the following special recognitions: "Fantastic" Award for putting the most fans on the robot to make it "Cool"; Outclock Award for efficiently using computing technologies on a lawnmower. This competition is organized by the Institute of Navigation, and co-sponsored by Air Force Research Laboratory, Joint Service Data Exchange, Honeywell, John Deere, Northrop Grumman, and Siebenthaler's Garden Center. The goal of the competition is for universities and colleges to design and operate an autonomous lawnmower using the art and science of navigation to rapidly and accurately mow a field of grass. Winning teams from this competition are recognized internationally through the Institute of Navigation Newsletter and publications. More information about the competition can be found at http://robomow.ion.org/.

Below are samples of recent Projects/Theses supervised by faculty:

Obstacle Detection & Avoidance System for an Autonomous Lawnmower, Michael Yeh, spring 2011

The Design of a Six DOF Robotic Arm as an Instructional Aid, Luan Truong, spring 2011.

Project/thesis Title: Aided Navigation: INS Mechanization and Kinematics, Kara Mayol, fall 2011.

Study on the use of Microsoft Kinect for Robotics Applications, Riyad El-laithy, spring 2012.

The Implementation of Low-level Control of Unmanned Utility Ground Robotic Vehicle, Tuo Wu, spring 2012

Reducing Computation for ML Detection in MIMO Systems Using a New Method, David Lee, spring 2012

VI. Resources and Facilities

A State and Non-state Support and Resources Received

The program is completely supported by the state.

B Special Equipment Used by the Program

The Electrical Engineering program maintains an ongoing plan for laboratory modernization. The plan sets up goals and objectives for the laboratory equipment purchase needs. The condition of all equipment is classified and priority lists are prepared. The Department has one full-time technician and shares another one with the Computer Science Department. This provides 1.5 highly qualified technicians who maintain the laboratory equipment.

Most of the standard laboratories are used in the BSEE program; however, all equipment can be used for the MSEE students when needed. The following is a brief description of our laboratories:

1. <u>EE Senior Design Laboratory</u>

Room E 302.

The EE Senior Design Laboratory is used for the design, simulation, implementation, and debugging of individual projects by seniors. The lab has 10 stations equipped with power supplies, multi-meters, and function generators. It is also equipped with Tektronix high-speed digital Scopes, up-to-date modern PCs, and printers. The computers have software for schematic capture and simulation for analog (PSpice), digital (ORCAD) and mixed mode circuits (MultiSim). Development systems for CPLD (Lattice Synario) and FPGA (Xilinx Foundation) are also installed on the computers. More advanced equipment such as Precision Power Supplies and LCR meters, EPROM burner, and Tektronix Logic Analyzers are available on some stations.

2. Electrical Circuits Laboratory

Room E303, 16 Stations.

This laboratory is adequately equipped with basic measurement and signal generating equipment for students to perform the experiments individually. The Laboratory has 16 stations each with HP module of Timer/counter, Function generator, Power supply and Multi-meter. A digital scope and banks of decade resistors, inductors, and capacitors are on each station. One station is assigned to each student to experiment with basic AC and DC circuits.

3. Power Laboratory

Room E 402, 8 Stations

The Electrical Machines Laboratory has 8 laboratory stations each with a Hampton AC and DC motor/generator set, a load bank, and patch panel for station configuration. These are large real-world motors delivering about 5 hp to the device under test. There are a set of transformers, high current and high voltage meters, and watts meters available at each station.

4. Global Positioning System Research Laboratory

Room E402C

The Global Positioning System Laboratory is used for senior students and faculty research projects in the areas of GPS and WAAS. It has state-of-the-art equipment including a NovaTel receiver, which acquires GPS and GEO signals of WAAS, a Magellan receiver to acquire signal from the Coast Guard, several hand-held Magellan receivers, and three antennas on the roof of the Engineering building.

5. Analog Electronic Laboratory

Room E 403, 16 Stations.

The Analog Electronic Laboratory has 16 stations each with HP module of Timer/counter, Function generator, Power supply, and Multi-meter. A high-speed 100MHz Digital Scope and banks of decade resistors and capacitors are on each station. Analog and digital IC testers and transistor curve tracers are also available. There are for print servers connected to eight printers for printing hard copies of the oscilloscope screens. A station is assigned to each student to experiment with basic and advanced electronic circuits.

6. Open Computing Laboratory

Room E 421

This laboratory is used for all computing needs of EE majors. It is available while the campus is open. Students may get permission to stay late night and during weekends. The lab has 16 stations equipped with latest PCs loaded with the following software:

Software Packages in E-421	Brief Description of Software
Microsoft Word	Word processor, used to prepare laboratory and project reports
Microsoft Excel	Spreadsheet program, used for creating tables of data for analysis or presentation purposes
Microsoft PowerPoint	Presentation software, used for lectures and some student projects and oral exams
Microsoft Internet Explorer	Internet tools, used for search of information and research on Internet
MATLAB	Used for solution of complicated mathematical problems, numerical analysis, digital signal processing, data presentation and visualization, etc.
MultiSim	Used for mixed mode simulation of analog and digital circuits
MultiHDL	VHDL Compiler for use with MultiSIM
L-Edit	VLSI Cell Layout Editor
MicroWind	VLSI Cell Layout Editor & Simulator
OrCAD/Pspice	Analog Device Simulation with Graphical Entry Tools
Extend	Systems Modeling and Simulation
Leonardo Spectrum	Digital Synthesis Tool for Standard Cell
Basic Stamp Editor	Stamp Microprocessor Module Programming Environment
Code Warrior HC12	Freescale 6812 C/C++/Assembly/Simulation IDE

7. Electro-Optics Laboratory

Room CS 109A.
The laboratory is for the purpose of teaching and research in modern optics, optical communications, lasers, and opto-electronic devices. It is used primarily for student projects and faculty research. The laboratory is equipped with coherent lasers, detectors, mirrors, computers and logic analyzers

8. Virtual and Simulation Laboratory

Room CS 301, 16 Stations
This lab is equipped with 16 stations with computers, printers, National Instruments DAQ , and PCI-GPIB cards. In 2007, this lab was developed with a funding of $100,000, to introduce our students to CAD tools in electrical engineering and LabView.

9. VLSI Design Laboratory

Room CS 404, 4 Stations
This laboratory was developed in 1989-90 with funding of $190,000 for equipment. The lab is composed of two areas: VLSI design and VLSI processing. The lab's primary function is to give student practical experience in single-chip VLSI design and the secondary function is to promote research activities in the area of VLSI processing and design.

10. Digital Logic and Microcomputer Laboratory

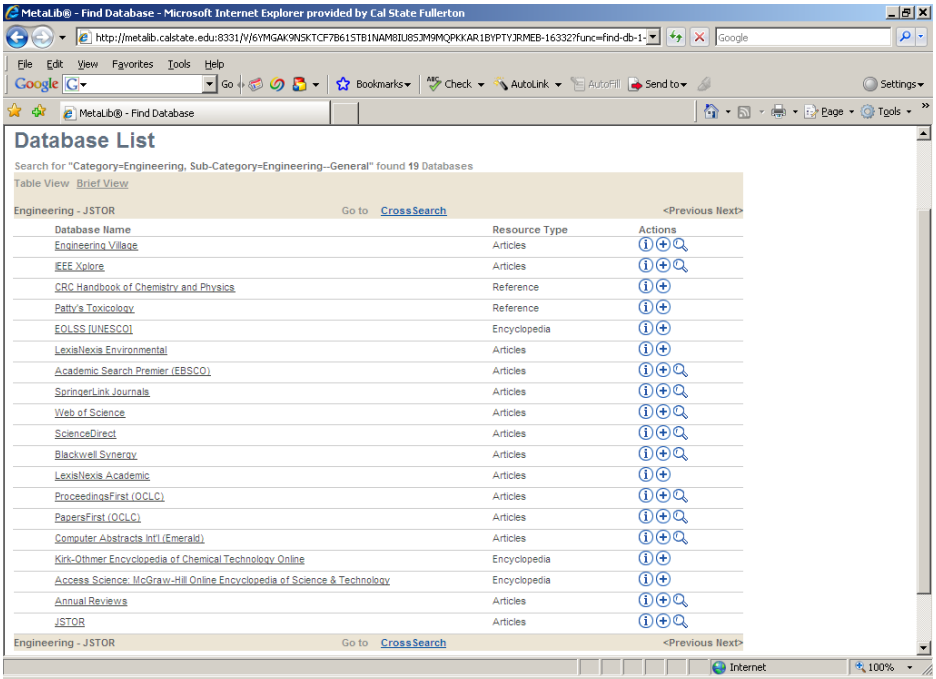
Room CS 406, 16 Stations
For digital logic study, the lab is equipped with 16 proto-boards with LEDs, switches and clock. Students design and put together simple digital circuits using ICs and verify their functionality. When the circuit design becomes too complex, they use MultiSim to simulate and verify the circuit. For the microprocessor study, the lab is equipped with sixteen 486 processors, printers and Agilent logic analyzers. The internal bus of the motherboard is brought out into a proto-board so students can build interface circuits with the processor.

C Library Resources

The Library catalog provides access to the Library's collections of some 2,250,000 items in a variety of formats: some 1,290,000 books, government documents, and audiovisual materials; over 2,300 currently received periodical subscriptions (approximately 1,400 are available in electronic format and approximately 1,000 in print format); approximately 1,150,000 microfilms; and over 200 electronic databases. Other important access tools include the following materials available from the Library's website:

- the Library's Database by Subject List

Library database list for Engineering:



- **Find Journals by Title list (A-Z finding list)**

The Library also utilizes SFX linking software, an Ex Libris product, to provide direct links from citations found in databases to full text articles and journals purchased by the Library.

The Pollak Library has over 500 computers available for students, faculty, and staff use, located throughout the North and South buildings. The primary site for library research activities is the Information & Learning Commons (ILC). This cluster of approximately 125 computer workstations is located on the 1st floor of Library North. A service desk staffed by the Reference Team (librarians and library staff) and Information Technology staff is located near the ILC to assist users with research needs and to provide technical support.

VII. Long-term Plans

A Summary of Long-term Plan

The MSEE program's long-term plan includes addition of new courses to keep up with the demands of the industry, employment of new faculty with expertise in the areas of high demand, continuous improvements of the program quality, use of modern facilities and equipment, and increasing enrollment.

B Long-term Plan on Implementation of the University's, Department' and Program's Mission and Goals

The mission and goals of the department are compatible with those of the college and the university. We plan to review our mission, goals, and learning outcomes on a three year cycle. After each cycle of the review, if needed, we will improve/modify our mission and goals to match those of the university, inputs from our constituencies, and the demands of the industry.

C Evidence of Support of Department Goals

The evidence of successful implementation of the program goals is measured by surveys, examinations, and monitoring of several variables. Those include successful employment of our alumni, surveys of their employers, review of procedures and policies, review of course contents, and monitoring the quality of the student learning. Collection of the assessment data (both direct and indirect), analysis of the measured data from extensive surveys, exams, projects, and appropriate interpretation of the analyzed data will provide insight to the level of program quality and student learning, and leads to performing continuous improvement based on the indicators.

D Long-term Budget Plan

Our budget is mostly supported by the state. It includes line items for salaries for faculty, operations and expenses, miscellaneous course fees, and special equipment. The large portion of other funds, other than the state supported fund, is from distance-learning fees. The department accepts students registering under University Extended Education (UEE) program, provides facilities for UEE, and participates in certificate programs offered by UEE. The UEE portion of the department budget is shown in the following table:

Year	UEE
2006-2007	7,478
2007-2008	8,444
2008-2009	6,426
2009-2010	14,629
2010-2011	27,149
2011-2012	10,660

VIII. Appendices Connected to the Self-study Student Support and Advising

Appendix 1. Undergraduate Degree Programs

TABLE 1. Undergraduate Program Applications, Admissions, and Enrollments

TABLE 1-A. First-time Freshmen: Program Applications, Admissions, and Enrollments

Special Admits

Academic Year	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2004-2005	4	4	100%	1	25%
2005-2006	9	9	100%	1	11%
2006-2007	6	6	100%	1	17%
2007-2008	5	5	100%	2	40%
2008-2009	2	2	100%	1	50%
2009-2010	1	1	100%	1	100%
2010-2011	0	0	---	0	---
2011-2012	0	0	---	0	---

Regular Admits

Academic Year	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2004-2005	302	187	62%	35	19%
2005-2006	679	401	59%	23	6%
2006-2007	665	368	55%	22	6%
2007-2008	721	396	55%	22	6%
2008-2009	273	157	58%	26	17%
2009-2010	352	227	64%	35	15%
2010-2011	412	205	50%	56	27%
2011-2012	359	172	48%	37	22%

TABLE 1-B. Upper Division Transfers: Program Applications, Admissions, and Enrollments

Academic Year	Applied	Admitted	% Admitted	Enrolled	% Enrolled
2004-2005	181	102	56%	34	33%
2005-2006	174	83	48%	28	34%
2006-2007	140	62	44%	21	34%
2007-2008	128	54	42%	16	30%
2008-2009	104	48	46%	15	31%
2009-2010	69	24	35%	8	33%
2010-2011	183	73	40%	28	38%
2011-2012	216	87	40%	34	39%

TABLE 2-A. Undergraduate Program Enrollment in FTES

Academic Year	Enrollment in FTES		
	Lower Division	Upper Division	Total
2004-05	15.4	51.1	66.5
2005-06	18.6	58.8	77.3
2006-07	23.3	69.6	92.9
2007-08	24.8	81.1	105.9
2008-09	23.8	80.2	103.9
2009-10	15.8	85.0	100.8
2010-11	18.6	80.0	98.5
2011-12	25.9	85.6	111.5

TABLE 2-B. Undergraduate Program Enrollment (Headcount)

Academic Year	Majors							
	Lower Division		Upper Division		Post Bacc (2nd Bacc, PBU, Cred intent)		Total	
	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES	Annualized Headcount	AY FTES
2004-2005	57.5	53.0	118.0	91.2	1.5	0.5	177.0	144.7
2005-2006	63.0	54.7	117.5	93.4	4.0	1.4	184.5	149.6
2006-2007	46.0	39.6	120.0	97.7	2.5	0.9	168.5	138.3
2007-2008	47.5	42.3	108.5	90.3	6.5	3.8	162.5	136.4
2008-2009	48.0	41.9	97.5	77.8	7.5	4.0	153.0	123.6
2009-2010	60.0	50.6	70.0	55.6	3.0	1.6	133.0	107.8
2010-2011	92.5	83.7	79.0	59.0	0.0	0.0	171.5	142.7
2011-2012	81.0	74.8	108.5	85.8	0.0	0.0	189.5	160.6

TABLES 3-A and 3-B. Graduation Rates for Majors

TABLE 3-A. First-time Freshmen Graduation Rates for Majors

Headcount

Entered In	Headcount	Graduated in 4 years		Graduated in 5 years		Graduated in 6 years		Graduated in 6 years plus 7th year persistence	
		in major	not in major	in major	not in major	in major	not in major	in major	not in major
Fall 2000	22	0	0	2	3	4	5	5	5
Fall 2001	14	0	0	2	1	2	1	3	4
Fall 2002	17	1	0	1	2	2	2	2	6
Fall 2003	29	1	0	2	3	4	7	6	9
Fall 2004	32	1	1	5	5	5	6	8	11
Fall 2005	23	0	0	0	3	2	5	3	5
Fall 2006	21	0	0	2	0				
Fall 2007	23	0	0						
Fall 2008	26								

Percent

Entered In	Headcount	% Graduated in 4 years		% Graduated in 5 years		% Graduated in 6 years		% Graduated in 6 years plus 7th year persistence	
		in major	not in major	in major	not in major	in major	not in major	in major	not in major
Fall 2000	22	0.0%	0.0%	9.1%	13.6%	18.2%	22.7%	22.7%	22.7%
Fall 2001	14	0.0%	0.0%	14.3%	7.1%	14.3%	7.1%	21.4%	28.6%
Fall 2002	17	5.9%	0.0%	5.9%	11.8%	11.8%	11.8%	11.8%	35.3%
Fall 2003	29	3.4%	0.0%	6.9%	10.3%	13.8%	24.1%	20.7%	31.0%
Fall 2004	32	3.1%	3.1%	15.6%	15.6%	15.6%	18.8%	25.0%	34.4%
Fall 2005	23	0.0%	0.0%	0.0%	13.0%	8.7%	21.7%	13.0%	21.7%
Fall 2006	21	0.0%	0.0%	9.5%	0.0%				
Fall 2007	23	0.0%	0.0%						
Fall 2008	26	0.0%	0.0%						

TABLE 3-B. Transfer Student Graduation Rates for Majors

Headcount

Entered In	Headcount	Graduated in 2 years		Graduated in 3 years		Graduated in 4 years		Graduated in 5 years		Graduated in 6 years plus 7th year persistence	
		in major	not in major	in major	not in major	in major	not in major	in major	not in major	in major	not in major
Fall 2000	6	1	0	3	0	3	0	5	0	5	0
Fall 2001	7	0	0	2	0	3	0	3	0	4	0
Fall 2002	10	0	0	2	0	4	0	4	0	6	0
Fall 2003	22	0	1	1	2	3	3	4	4	7	4
Fall 2004	20	0	0	6	0	9	0	10	0	11	0
Fall 2005	21	1	0	9	0	10	0	10	0	11	0
Fall 2006	13	0	0	2	0	4	0	6	0		
Fall 2007	9	0	0	0	1	1	2				
Fall 2008	7	0	0	1	1						
Fall 2009	8	0	1								
Fall 2010	16										

Percent

Entered In	Headcount	% Graduated in 2 years		% Graduated in 3 years		% Graduated in 4 years		% Graduated in 5 years		% Graduated in 6 years plus 7th year persistence	
		in major	not in major	in major	not in major	in major	not in major	in major	not in major	in major	not in major
Fall 2000	6	16.7%	0.0%	50.0%	0.0%	50.0%	0.0%	83.3%	0.0%	83.3%	0.0%
Fall 2001	7	0.0%	0.0%	28.6%	0.0%	42.9%	0.0%	42.9%	0.0%	57.1%	0.0%
Fall 2002	10	0.0%	0.0%	20.0%	0.0%	40.0%	0.0%	40.0%	0.0%	60.0%	0.0%
Fall 2003	22	0.0%	4.5%	4.5%	9.1%	13.6%	13.6%	18.2%	18.2%	31.8%	18.2%
Fall 2004	20	0.0%	0.0%	30.0%	0.0%	45.0%	0.0%	50.0%	0.0%	55.0%	0.0%
Fall 2005	21	4.8%	0.0%	42.9%	0.0%	47.6%	0.0%	47.6%	0.0%	52.4%	0.0%
Fall 2006	13	0.0%	0.0%	15.4%	0.0%	30.8%	0.0%	46.2%	0.0%		
Fall 2007	9	0.0%	0.0%	0.0%	11.1%	11.1%	22.2%				
Fall 2008	7	0.0%	0.0%	14.3%	14.3%						
Fall 2009	8	0.0%	12.5%								
Fall 2010	16										

TABLE 4. Undergraduate Degrees Awarded

Academic Year	Degrees Awarded
2003-2004	22
2004-2005	29
2005-2006	27
2006-2007	23
2007-2008	33
2008-2009	27
2009-2010	23
2010-2011	19
8-Yrs Total	**203**
Last 5-Yrs Total	**125**

Appendix 2. Graduate Degree Programs

TABLE 5. Graduate Program Applications, Admissions, and Enrollments

Academic Year	# Applied	# Admitted	% Admitted	# Enrolled	% Enrolled
2004-2005	129	85	66%	39	46%
2005-2006	124	69	56%	28	41%
2006-2007	148	96	65%	42	44%
2007-2008	257	185	72%	85	46%
2008-2009	368	228	62%	64	28%
2009-2010	235	142	60%	50	35%
2010-2011	291	204	70%	69	34%
2011-2012	333	251	75%	50	20%

TABLE 6-A. Graduate Program Enrollment in FTES

Academic Year	Enrollment in FTES (AY)
2004-2005	17.2
2005-2006	21.4
2006-2007	20.0
2007-2008	33.4
2008-2009	39.5
2009-2010	38.3
2010-2011	38.2
2011-2012	27.1

Table 6-B. Graduate Program Enrollment in Headcount

Academic Year	Headcount majors				
	Master's	Doctoral	Credential	Total	FTES per headcount
2004-2005	78.0			78.0	35.6
2005-2006	70.5			70.5	35.1
2006-2007	74.0			74.0	35.8
2007-2008	104.5			104.5	57.2
2008-2009	126.5			126.5	64.5
2009-2010	143.5			143.5	66.0
2010-2011	143.5			143.5	65.4
2011-2012	120.5			120.5	57.1

TABLE 7. Graduate Students Graduation Rate

Headcount

All Master's Enrolled in:	Headcount	Graduated within 1 year	Graduated within 2 years	Graduated within 3 years	Graduated in 4 years	Graduated in 5 years	Graduated in 6 years plus 7 year persistence
Fall 2000	26	2	10	14	15	18	18
Fall 2001	22	3	9	12	14	15	15
Fall 2002	19	0	6	10	12	13	13
Fall 2003	18	0	6	10	11	11	11
Fall 2004	25	0	6	11	15	16	18
Fall 2005	20	0	6	9	11	11	11
Fall 2006	24	2	8	12	13	15	
Fall 2007	40	0	17	29	29		
Fall 2008	32	1	12	22			
Fall 2009	50	1	14				
Fall 2010	55	0					

Percent

All Master's Enrolled in:	Headcount	% Graduated within 1 year	% Graduated within 2 years	% Graduated within 3 years	% Graduated in 4 years	% Graduated in 5 years	% Graduated in 6 years plus 7 year persistence
Fall 2000	26	7.7%	38.4%	53.8%	57.7%	69.2%	69.2%
Fall 2001	22	13.6%	40.9%	54.5%	63.6%	68.2%	68.2%
Fall 2002	19	0.0%	31.6%	52.6%	63.2%	68.4%	68.4%
Fall 2003	18	0.0%	33.3%	55.6%	61.1%	61.1%	61.1%
Fall 2004	25	0.0%	24.0%	44.0%	60.0%	64.0%	72.0%
Fall 2005	20	0.0%	30.0%	45.0%	55.0%	55.0%	55.0%
Fall 2006	24	8.3%	33.3%	50.0%	54.2%	62.5%	
Fall 2007	40	0.0%	42.5%	72.5%	72.5%		
Fall 2008	32	3.2%	37.5%	68.8%			
Fall 2009	50	2.0%	28.0%				
Fall 2010	55	0.0%					

TABLE 8. Master's Degrees Awarded

Academic Year	Degrees Awarded
2003-2004	19
2004-2005	36
2005-2006	23
2006-2007	31
2007-2008	25
2008-2009	50
2009-2010	43
2010-2011	59

Appendix 3. Plan for Documentation of Academic Achievement (Assessment of Student Learning)

Department/Program: **Master of Science in Electrical Engineering**

P = Planning E = Emerging D = Developed HD = Highly Developed

	Achievement Plan Component	P	E	D	HD	Comments/Details
I	**Mission Statement**					
	a. Provide a concise and coherent statement of the goals and purposes of the department / program				X	
	b. Provide a comprehensive framework for student learning outcomes				X	
	c. Describe department/program assessment structure, e.g. committee, coordinator				X	
II	**Student Learning Goals**					
	a. Identify and describe knowledge, skills, or values expected of graduates				X	
	b. Consistent with mission				X	
	c. Provide the foundation for more detailed descriptions of learning outcomes				X	
III	**Student Learning Outcomes**					
	a. Aligned with learning goals				X	
	b. Use action verbs that describe knowledge, skills, or values students should develop				X	
	c. Specify performance, competencies, or behaviors that are observable and measurable				X	

IV	**Assessment Strategies**					
	a. Use specific multiple measures for assessment of learning outcomes other than grades				X	
	b. Use direct measures of student learning outcomes				X	
	c. Indirect measures may also be used but along with direct measures				X	
	d. Measures are aligned with goals/ learning outcomes				X	
	e. Each goal/ outcome is measured				X	
V	**Utilization for Improvement**					
	a. Identify who interprets the evidence and detail the established process			X		
	b. How are findings utilized? Provide examples		X			
	c. Attach a timeline for the assessment of each department/program learning outcome			X		

Appendix 4. Faculty

TABLE 9. Full-Time Instructional Faculty, FTEF, FTES, SFR

YEAR	Tenured	Tenure Track	Sabbaticals at 0.5	FERP at 0.5	Lecturers	FTEF Allocation	FTES Target	Actual FTES	Budgt SFR
2003-2004	14	0		0	0	12.0	109	105.7	9.1
2004-2005	14	0		0	0	12.0	109	97.2	9.1
2005-2006	12	0		2	0	12.5	127	105.7	10.2
2006-2007	11	0		3	0	12.5	127	116.5	10.2
2007-2008	11	0		3	1	12.3	142	142.3	11.5
2008-2009	11	0		3	1	13.0	146	146.2	11.2
2009-2010	10	1		2	0	12.0	142	141.9	11.8
2010-2011	11	2		0	0	12	143	143.3	11.9

Tenured and tenure track totals Include faculty on leave and administrators with retreat rights.

Sabbaticals supplied by department.

Appendix 5. Resources

Our budget is mostly supported by the state. It includes line items for Salaries for Faculty, Operating Expenses and Equipment (OE&E), Miscellaneous Course Fees, and Special Equipment. The large portion of other funds, other than the state supported fund, is from distance-learning fees. The department accepts students registering under University Extended Education (UEE) program, provides facilities to UEE, and participates in certificate programs offered by UEE.

TABLE 10. Resources

Year	OE&E Allocation	Misc. Course Fees	Spec. Equip. / Lab.	Lottery	UEE
2006-2007					7,478
2007-2008	18,045	15,662	58,162	23,222	8,444
2008-2009	10,000	14,764	13,711	1,008	6,426
2009-2010	10,346	16,377	-	-	14,629
2010-2011	11,500	16,090	61,000	-	27,149
2011-2012	12,500	18,940	-	-	10,660

Appendix 6. Definition & Examples of Indicators of Quality & Measures of Productivity

As described in the main body of this report, EE Department has a set of well-defined Goals and Student Learning Outcomes. Section B.V.B shows some of the most recent results of our student's research and projects. In this appendix we show a summary of the assessment results of our Goals and SLOs. We measure Goals and SLOs indirectly, by means of surveys, and directly, by means of exams, projects, and interviews. Criterion for passing the surveys is to have a minimum of 70% of the replies in the highest two categories of the survey. Criterion for passing exams and tests is to have a minimum class average of 70/100.

As indicated previously, assessment of 400-level courses is a part of the department's review for our accreditation agency, ABET. As such, we will refer to the results of assessment of these courses done for ABET in this report. Following are examples of some of the assessment results of goals and SLOs:

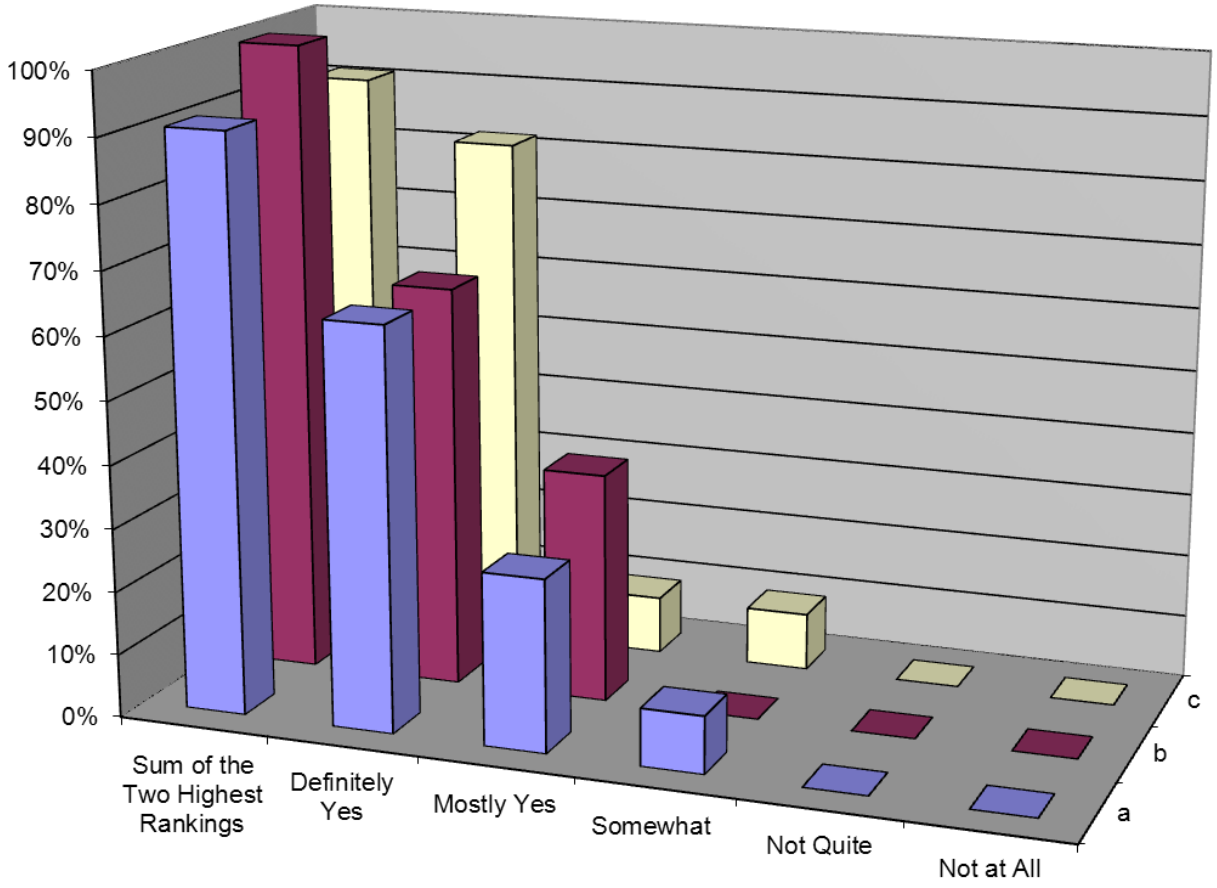
400-level courses:

Indirect measurement of goals

TABLE 6.1 Summary of Results of 2011 Alumni Survey

Goal	Level of Agreement					
	Sum of the Two Highest Rankings	Definitely Yes	Mostly Yes	Somewhat	Not Quite	Not at All
A	91%	64%	27%	9%	0%	0%
B	100%	64%	36%	0%	0%	0%
C	91%	82%	9%	9%	0%	0%
Total Number of Respondents			11			

Summary of 2011 Alumni Survey



Direct measurement of goals

TABLE 6.2 Summary of Results of 2011 Employer Survey

Goal	Level of Agreement					
	Sum of the Two Highest Rankings	Definitely Yes	Mostly Yes	Somewhat	Not Quite	Not Enough Information to Evaluate
A	100%	100%	0%	0%	0%	0%
B	100%	100%	0%	0%	0%	0%
C	100%	100%	0%	0%	0%	0%
Total Number of Respondents				7		

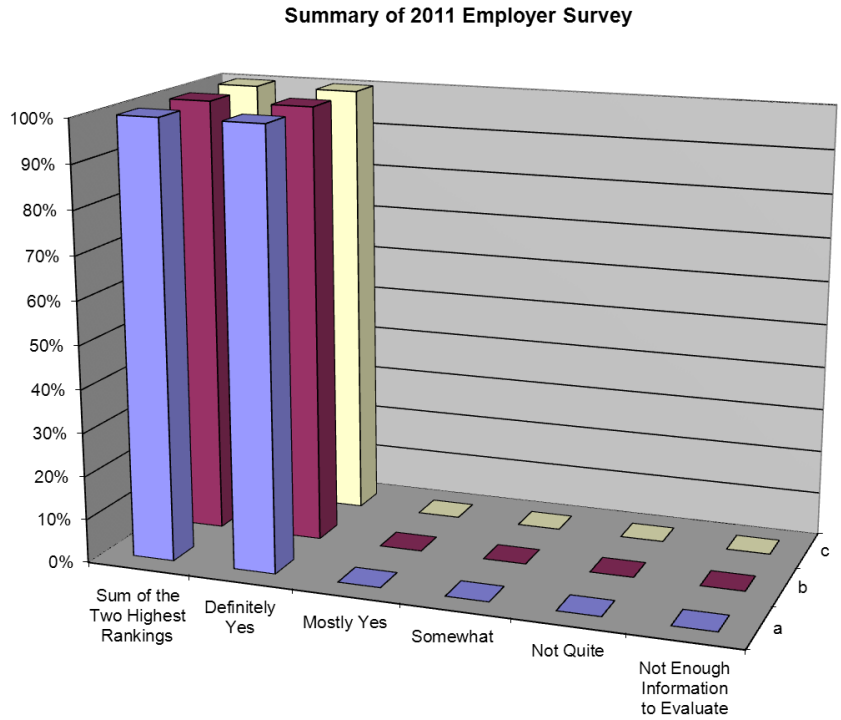


TABLE 6.3 Relation between Goals & SLOs for 400-level Courses

	GOALS	STUDENT LEARNING OUTCOMES (SLOs)	a	b	c	d	e	f	g	h	i	j	k
			An ability to apply knowledge of mathematics, science and engineering	An ability to design and conduct experiments, as well as to analyze and interpret data	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	An ability to work on multi-disciplinary teams	An ability to identify, formulate and solve engineering problems	An understanding of professional and ethical responsibility	An ability to communicate effectively	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	A recognition of the need for, and an ability to engage in life-long learning	A knowledge of contemporary issues	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
A	**Technical Growth:** Graduates will be successful in modern engineering practice, integrate into the local and global workforce, and contribute to the economy of California and the nation.		√	√	√	√	√	√	√	√	√	√	√
B	**Professional Skills:** Graduates will continue to demonstrate the professional skills necessary to be competent employees, assume leadership roles, and have career success and satisfaction.		√	√	√		√		√	√	√	√	√
C	**Professional Attitude and Citizenship:** Graduates will become productive citizens with high ethical and professional standards, who make sound engineering or managerial decisions, and have enthusiasm for the profession and professional growth.				√	√		√	√	√	√		

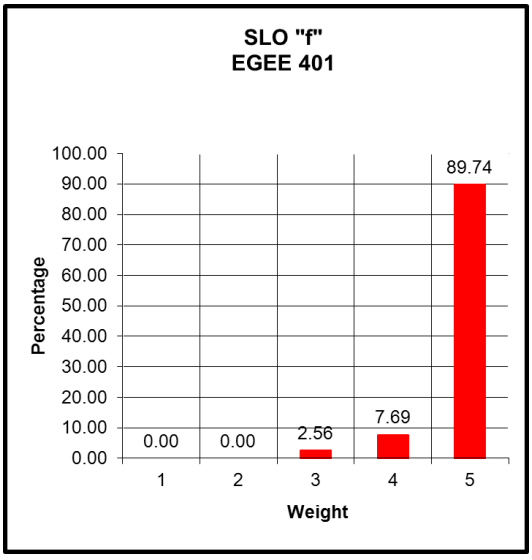
Every single SLO is individually assessed, both indirectly and directly. Below is an example:

Indirect measurement of 400-level SLO "f": Survey question: How much did the class help to develop "An understanding of professional and ethical responsibility?" (Circle one number).

2011 - 2012

Evaluation Summary for SLO "f" of EGEE 401

EGEE 401		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	1	2.56
4	3	7.69
5	35	89.74
Number of Students	39	



Direct measurement of 400-level SLO "f":

2011 - 2012 Direct Assessment

Evaluation Summary for SLO "f"

Description of SLO "f":

An understanding of professional and ethical responsibility.

Selected Course	No. of Students	Average
EGEE 401 [1]	46	71
EGEE 485 [2]	9	65
Total Number of Students	55	

Overall Average (Sum of Products of Number of Students of Each Course and Corresponding Average Divided by Total Number of Students):	70.06

1. A set of true or false questions was designed for the assessment of this SLO in this course.
2. Eight (8) questions were considered for the assessment of this SLO in this course.

500-level courses:

As specified in section B.I, the **Department has the following goals:**

A. Technical Growth: Graduates will be successful in modern engineering practice, integrate into the local and global workforce, and contribute to the economy of California and the nation.

B. Professional Skills: Graduates will continue to demonstrate the professional skills necessary to be competent employees, assume leadership roles, and have career success and satisfaction.

C. Professional Attitude and Citizenship: Graduates will become productive citizens with high ethical and professional standards, who make sound engineering or managerial decisions, and have enthusiasm for the profession and professional growth.

The graduate SLOs are set by the department and are as follows:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
3. Ability to integrate into the local and global workforce
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
5. Ability to assume leadership roles
6. Ability to communicate effectively by using written, oral, and electronic methods

These Goals and SLOs are assessed using surveys and direct measurements of our 500-level courses. Following are some examples of the results of our assessment:

Indirect Assessment of Goals

Summary of Results of 2012 MSEE Alumni Survey

Goal	Level of Agreement					
	Sum of the Two Highest Rankings	Definitely Yes	Mostly Yes	Somewhat	Not Quite	Not at All
A	**100%**	86%	14%	0%	0%	0%
B	**100%**	71%	29%	0%	0%	0%
C	**100%**	100%	0%	0%	0%	0%
Total Number of Respondents			7			

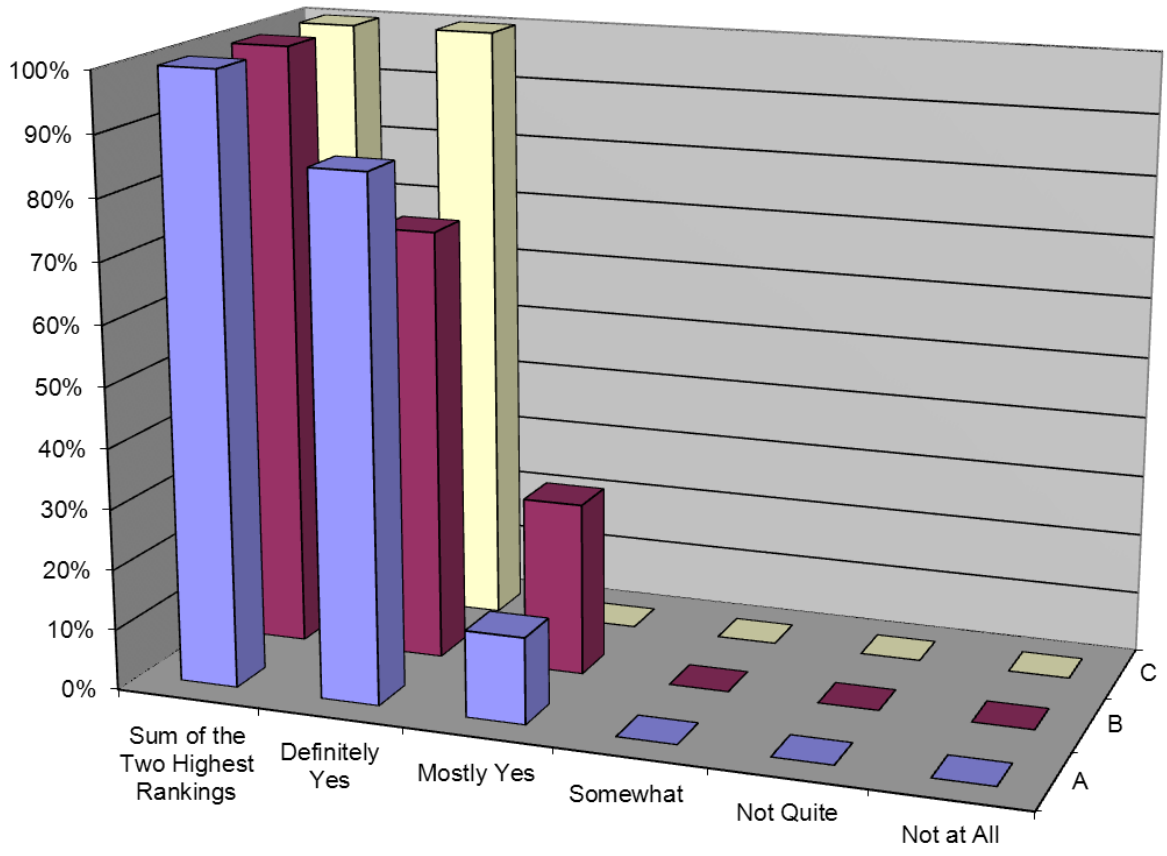
Questions asked: As a result of your Electrical Engineering education at CSUF, do you feel that:

A) You are trained and successful in modern engineering practice, you can integrate into local and global workforce, and contribute to the economy of California and the nation?

B) You were trained well to continue to demonstrate the professional skills necessary to be competent employees, assume leadership roles, and have career success and satisfaction?

C) Your training provided you with the ability to become a productive citizen with high ethical and professional standards, who makes sound engineering or managerial decisions, and has enthusiasm for the profession and professional growth?

Summary of 2012 MSEE Alumni Survey



Direct Assessment of Goals

Summary of Results of 2012 MSEE Employer Survey

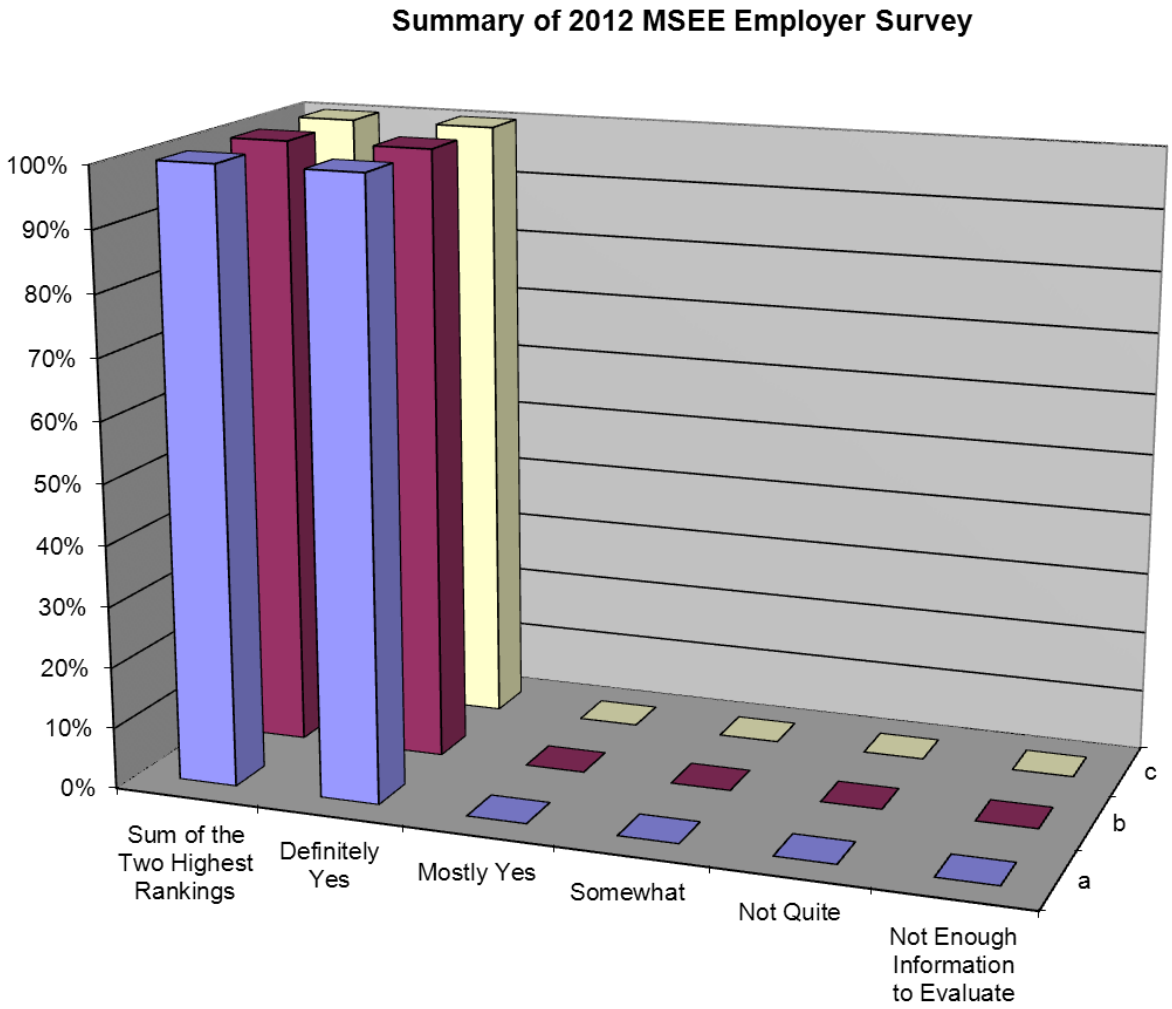
Goal	Level of Agreement					
	Sum of the Two Highest Rankings	Definitely Yes	Mostly Yes	Somewhat	Not Quite	Not Enough Information to Evaluate
A	**100%**	100%	0%	0%	0%	0%
B	**100%**	100%	0%	0%	0%	0%
C	**100%**	100%	0%	0%	0%	0%
Total Number of Respondents				4		

Questions asked: The electrical engineering graduate from California State University, Fullerton, under your supervision

A) Is trained and successful in modern engineering practice, can integrate into the local and global workforce, and contribute to the economy of California and the nation.

B) Is trained well to continue to demonstrate the professional skills necessary to be a competent employee, assume leadership roles, and have career success and satisfaction.

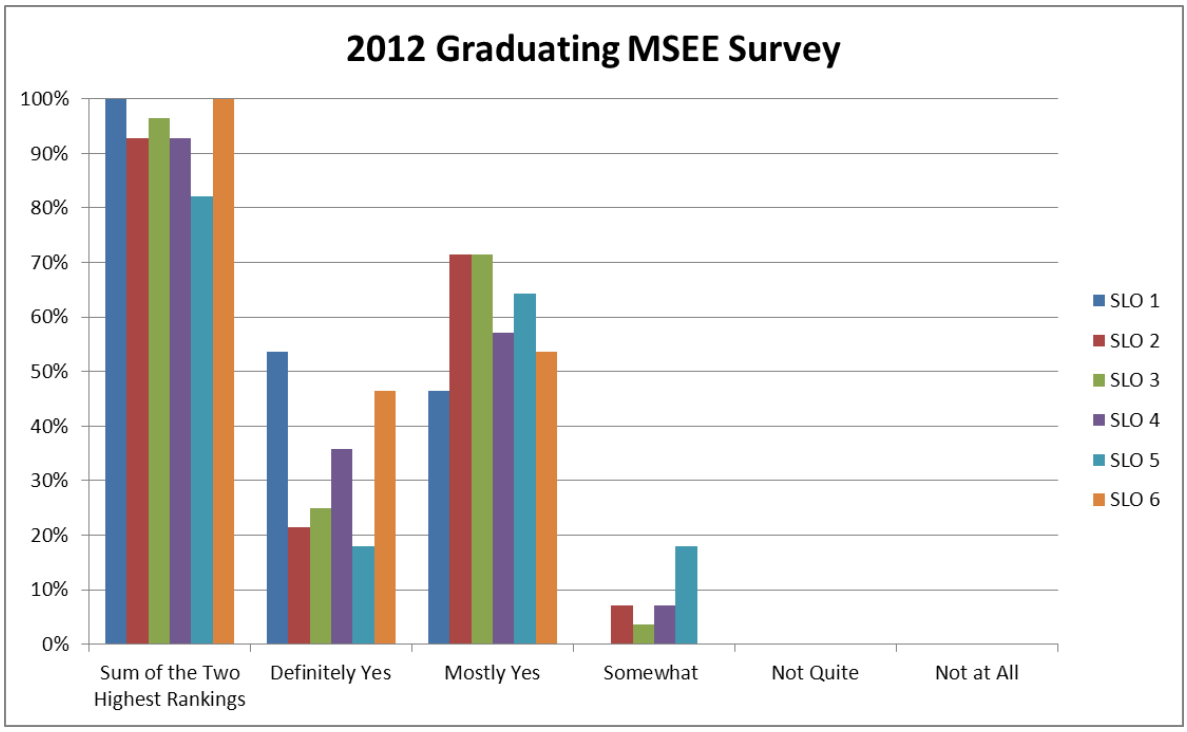
C) His/her training provided him/her with the ability to become a productive citizen with high ethical and professional standards, who makes sound engineering or managerial decisions, and has enthusiasm for the profession and professional growth.


Summary of 2012 MSEE Employer Survey
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Sum of the Two Highest Rankings
Definitely Yes
Mostly Yes
Somewhat
Not Quite
Not Enough Information to Evaluate
c
b
a

Indirect Assessment of SLOs

Summary of Results of Spring 2012 Graduating MSEE Survey

SLO	Level of Agreement					
	Sum of the Two Highest Rankings	Definitely Yes	Mostly Yes	Somewhat	Not Quite	Not at All
1	100%	54%	46%	0%	0%	0%
2	93%	21%	71%	7%	0%	0%
3	96%	25%	71%	4%	0%	0%
4	93%	36%	57%	7%	0%	0%
5	82%	18%	64%	18%	0%	0%
6	100%	46%	54%	0%	0%	0%
Total Number of Respondents				28		



Indirect Assessment of individual SLOs

2011 - 2012

Evaluation Summary for SLO "1"

Description of Student (Program) Learning Outcome (SLO) "1":
Academic preparation and the proficiency in mathematics, and science.

EGEE 507		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	0	0.00
4	3	30.00
5	7	70.00
Number of Students	10	

EGEE 580		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	0	0.00
4	5	23.81
5	16	76.19
Number of Students	21	

EGEE 582		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	1	6.25
4	4	25.00
5	11	68.75
Number of Students	16	

Percentage (Total Number of Answers with Weight of 4 or 5 Divided by Total Number of Students Times 100):	**97.87%**

2011 - 2012

Evaluation Summary for SLO "2"

Description of Student (Program) Learning Outcome (SLO) "2":

Ability to solve problems in modern engineering practice.

EGEE 523B		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	1	8.33
4	4	33.33
5	7	58.33
Number of Students	12	

EGEE 537		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	1	10.00
4	1	10.00
5	8	80.00
Number of Students	10	

EGEE 558B		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	0	0.00
4	3	30.00
5	7	70.00
Number of Students	10	

Percentage (Total Number of Answers with Weight of 4 or 5 Divided by Total Number of Students Times 100):	**93.75%**

2011 - 2012

Evaluation Summary for SLO "3"

Description of Student (Program) Learning Outcome (SLO) "3":
Ability to integrate into the local and global workforce.

EGEE 537		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	0	0.00
4	3	30.00
5	7	70.00
Number of Students	10	

Percentage (Total Number of Answers with Weight of 4 or 5 Divided by Total Number of Students Times 100):	**100.00%**

2011 - 2012

Evaluation Summary for SLO "4"

Description of Student (Program) Learning Outcome (SLO) "4":
Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints.

EGEE 503		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	1	4.17
3	1	4.17
4	8	33.33
5	14	58.33
Number of Students	24	

EGEE 558B		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	0	0.00
4	2	20.00
5	8	80.00
Number of Students	10	

EGEE 580		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	1	4.76
4	5	23.81
5	15	71.43
Number of Students	21	

Percentage (Total Number of Answers with Weight of 4 or 5 Divided by Total Number of Students Times 100):	**94.55%**

2011 - 2012

Evaluation Summary for SLO "6"

Description of Student (Program) Learning Outcome (SLO) "6":
Ability to communicate effectively by using written, oral, and electronic methods.

EGEE 507		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	1	10.00
4	4	40.00
5	5	50.00
Number of Students	10	

EGEE 523B		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	1	8.33
4	5	41.67
5	6	50.00
Number of Students	12	

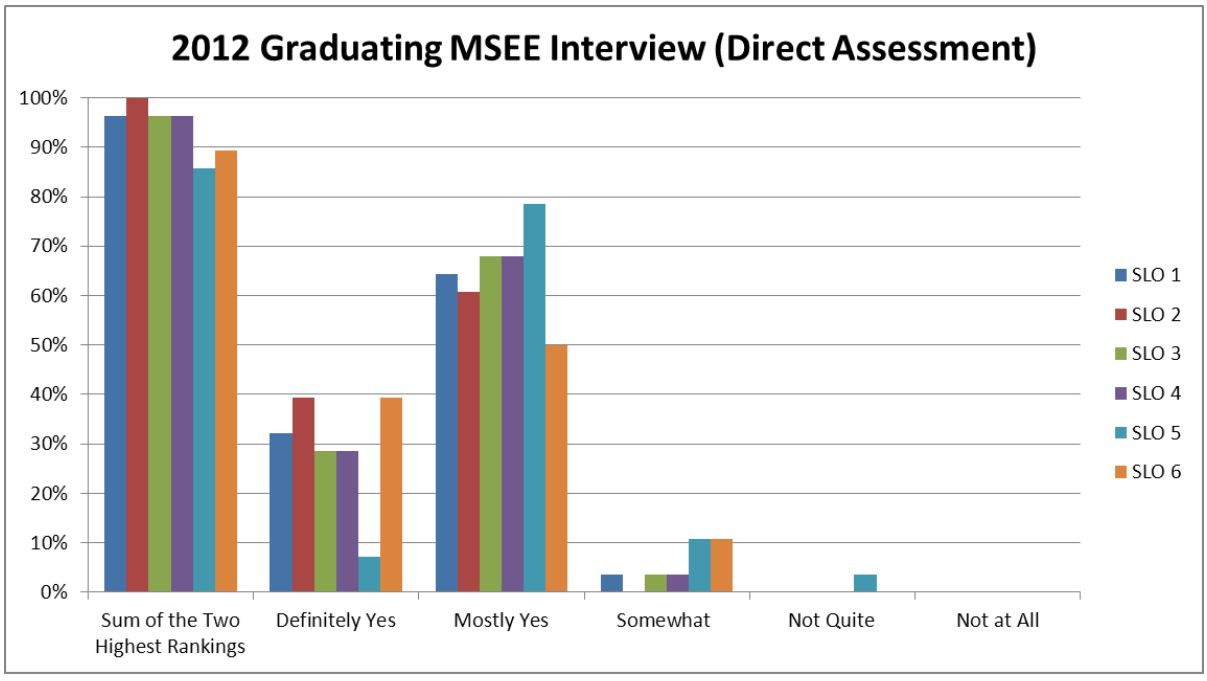
EGEE 537		
Weight	No. of Times Marked	Percentage
1	0	0.00
2	0	0.00
3	0	0.00
4	2	20.00
5	8	80.00
Number of Students	10	

Percentage (Total Number of Answers with Weight of 4 or 5 Divided by Total Number of Students Times 100):	**93.75%**

Direct Assessment of SLOs

Summary of Results of Spring 2012 Graduating MSEE Interview

SLO	Level of Agreement					
	Sum of the Two Highest Rankings	Definitely Yes	Mostly Yes	Somewhat	Not Quite	Not at All
1	96%	32%	64%	4%	0%	0%
2	100%	39%	61%	0%	0%	0%
3	96%	29%	68%	4%	0%	0%
4	96%	29%	68%	4%	0%	0%
5	86%	7%	79%	11%	4%	0%
6	89%	39%	50%	11%	0%	0%
Total Number of Respondents			28			



Direct Assessment of individual SLOs

2011 - 2012 Direct Assessment

Evaluation Summary for SLO "1"

Description of Student Learning Outcome (SLO) "1":
Academic preparation and the proficiency in mathematics, and science

Selected Course	No. of Students	Average
EGEE 503 [1]	26	74
EGEE 518 [2]	24	94
EGEE 558B [3]	12	71
Total Number of Students	62	

Overall Average (Sum of Products of Number of Students of Each Course and Corresponding Average Divided by Total Number of Students):	**81.16**

1. A special project was considered for the assessment of this SLO in this course.
2. A Project, report, and presentation were considered for the assessment of this SLO.
3. Question C.3 in the final exam was considered for the assessment of this SLO in this course.

2011 - 2012 Direct Assessment

Evaluation Summary for SLO "2"

Description of Student Learning Outcome (SLO) "2":
Ability to solve problems in modern engineering practice

Selected Course	No. of Students	Average
EGEE 503 [1]	11	80
EGEE 537 [2]	11	83
EGEE 558B [3]	12	75
Total Number of Students	34	

Overall Average (Sum of Products of Number of Students of Each Course and Corresponding Average Divided by Total Number of Students):	**79.21**

1. A special project was considered for the assessment of this SLO in this course.
2. A special project (two problems) was considered for the assessment of this SLO.
3. A Project/Presentation was considered for the assessment of this SLO in this course.

2011 - 2012 Direct Assessment

Evaluation Summary for SLO "3"

Description of Student Learning Outcome (SLO) "3":
Ability to integrate into the local and global workforce

Selected Course	No. of Students	Average
EGEE 507 [1]	11	80
EGEE 518 [2]	24	94
EGEE 537 [3]	11	82
Total Number of Students	46	

Overall Average (Sum of Products of Number of Students of Each Course and Corresponding Average Divided by Total Number of Students):	**87.78**

1. Second test was considered for the assessment of this SLO in this course.
2. A Project, report, and presentation were considered for the assessment of this SLO.
3. A special project was considered for the assessment of this SLO in this course.

2011 - 2012 Direct Assessment

Evaluation Summary for SLO "4"

Description of Student Learning Outcome (SLO) "4":
Ability to identify, formulate, design, implement, and solve engineering within realistic constraints

Selected Course	No. of Students	Average
EGEE 503 [1]	26	72
EGEE 507 [2]	11	81
EGEE 558B [3]	12	71
Total Number of Students	49	

Overall Average (Sum of Products of Number of Students of Each Course and Corresponding Average Divided by Total Number of Students):	**73.78**

1. A special project was considered for the assessment of this SLO in this course.
2. Second test was considered for the assessment of this SLO in this course.
3. Question C.1 in the final exam was considered for the assessment of this SLO.

2011 - 2012 Direct Assessment

Evaluation Summary for SLO "6"

Description of Student Learning Outcome (SLO) "6":
Ability to communicate effectively by using written, oral, and electronic methods

Selected Course	No. of Students	Average
EGEE 503 [1]	26	76
EGEE 518 [2]	24	94
EGEE 537 [3]	11	79
Total Number of Students	61	

Overall Average (Sum of Products of Number of Students of Each Course and Corresponding Average Divided by Total Number of Students):	**83.62**

1. A special project was considered for the assessment of this SLO in this course.
2. A Project, report, and presentation were considered for the assessment of this SLO.
3. A special project was considered for the assessment of this SLO in this course.

The results of our assessments indicate successful achievement of the department Goals, and Student Learning Outcomes. We will continue to assess the goals and SLOs and use the results to further improve the program.

Appendix 7. Curriculum Vitae of faculty

Maqsood A. Chaudhry

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: B.S., Electrical Engineering, University of Engineering and Technology, Lahore, Pakistan, 1978.

M.S., Electrical Engineering, California State University, Fullerton, 1982

Ph.D., Electrical Engineering, University of California, Irvine, 1989.

Service at CSUF: 24 Years

Date of Original Appointment: August 1984, Lecturer, Full-Time

Date of Advancement in Rank: August 1991, Assistant Professor
August 1996, Associate Professor
August 2003, Professor

Other related Experience:

Consulting, patents:

Publications (Last 5 years):

Chaudhry, M. A., "Conformal Mapping in Education and Engineering Practice", under review by the Pakistan Journal of Engineering and Applied Sciences, Vol. 11, July 2012.

Radhalakshami Ramakrishnan and Chaudhry, M. A., "Design of Ultra Low Voltage Operational Amplifier Using 0.12μm Technology," under review by Microelectronics International.

Radhalakshami Ramakrishnan and Chaudhry, M. A., "A 1.2 Volts Single Supply Operational Amplifier using 0.13μm Technology," Microelectronics International, Vol. 24, No. 2, pp 46-52, 2007.

Chaudhry, M. A., "Potential Using Finite Element Analysis and Conformal Mapping in Two-dimensional Unbounded Regions," International Journal of Electrical Engineering Education, Vol. 44, No. 1, pp 34-42, 2007.

Grants

To Perform Collaborative Research and Educational Activities with Two Universities in Pakistan, A two year project funded in January 2008 by United States International Agency for International Development (USAID). Total amount: US$ 250,000.00.

Scientific and Professional Societies:

Member of IEEE

Honors and Awards:

Mentioned in **Marquis Who's Who in America,** 2007 Edition.

Distinguished Engineering Educator Award, 2004**,** Orange County Engineering Council.

Boeing A. D. Welliver Fellow, 2002.

Institutional and Professional service in the last five years:

Member Department ABET Committee
Member University General Education Committee
Member Department Personnel Committee

Percentage of Time Available for Research or Scholarly Activities

25%

Percentage of Time committed to the program

100%

Courses Taught This Year:

Fall 2011

EGEE 310 – Electronic Circuits
EGEE 311 –Field Theory and Transmission Lines
EGEE 313 – Introduction to Electromechanics
EGEE 424 – Computer Simulation of Continuous Systems

Spring 2012

EGEE 203 – Electric Circuits Lab.
EGEE 245 – Computer Logic and Architecture
EGEE 310 – Electronic Circuits
EGEE 313 – Introduction to Electromechanics

David Cheng

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: BS Physics, National Taiwan University, 1968
MS Physics, University of California, Solid State Physics, 1972
Ph.D. Physics, University of California, Irvine, Solid State Physics, 1975

Service at CSUF: Twenty six Years

Date of Original Appointment: January 1985, Associate Professor

Date of Advancement in Rank: August 2007, Professor

Other Related Experience:

1997 – 2001: Head, Electrical Engineering Department, CSUF
1996 - present: Chairman, Professional Activities Council for Engineers, IEEE Orange County Section
1996 – 2000: Coordinator, Los Angeles Council of Engineers and Scientists (LACES)
1996 – 1998: Sections Coordinator, IEEE Los Angeles Council (14,000 members)
1994 – 1996: Chairman, IEEE Orange County Section (4,000 members)
1994 - 2006 President, Asian American Faculty and Staff Association (AFSA, CSUF)
1991: Life Fellow, Institute for the Advancement of Engineering (IAE)
1987 – 1988: Associate Dean of School of Engineering and Computer Science (ECS), CSUF
1977 – 1983: Associate Professor, California State University, Long Beach (CSULB)
1975 -1977: Senior Research Fellow, University of California, Irvine (UCI)

Consulting, patents:

Taiwan Metal Institute of Research and Development
China Opto-Electronic Research Institute

Publications (Last 5 years):

5 international conference papers
3 invited international conference keynote speakers on Green Technologies
6 invited talks at 6 universities
2 invited short courses on solar cell technologies and wireless energy transfer and charging systems

Scientific and Professional Societies:

Institute of Electronics and Electrical Engineering (IEEE)
American Physical Society (APS)
Solid State Division, APS
Systems and Circuits Society, IEEE
American Association for the Advancement of Science (AAAS)
Association for Computing Machinery (ACM)
The Society for Computer Simulation International (SCS)
International Society for Computer and Their Applications (ISCA)
Fellow (honor), Institute for the Advancement of Engineering (IAE)

Honors and Awards:

"IEEE Millennium Medals Awards," for outstanding professional achievements, 2000
"Honorable Professorship" from Hunan University, China, July 2000.
"Outstanding Leadership and Service Award", IEEE USA
IEEE Certificate for service awards of Orange County Section, 1992-2012

Institutional and Professional service in the last five years:

California Faculty Association Board member
University advanced committee
University Research Committee
University Library Committee
Undergraduate EE Adviser
Faculty Adviser, IEEE Student Chapter

Courses Taught This Year:

Fall 2011

EGEE 303L – Electronic Laboratory
EGEE 310L – Electronic Circuits Laboratory
EGEE 410 – Electro-Optical Systems
EGEE 510 – Optics & Electromagnetics in Communication
Spring 2012

EGEE 303L – Electronic Laboratory
EGEE 310L – Electronic Circuits Laboratory
EGEE 455 – Micro and Nano Electronics
EGEE 480 – Engineering Optics

George I. Cohn

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: B.S., Electrical Engineering , California Institute of Technology, 1942
M.S., Electrical Engineering, Illinois Institute of Technology, 1947
Ph.D., Electrical Engineering, Illinois Institute of Technology,1951

Service at CSUF: 44 Years

Date of Original Appointment: August 1968, Professor

Other related Experience:

Consulting, patents:
Patents
1. "Method and Means for Determining Volume of Liquid in a Tank", No. 3,447,374 issued 3 Jun 69
2. "Highly-Stable Orthogonal Coil Configurations", No. 3,457,502 issued 22 Jul 69
3. “Electric Field Intensity Indicator Employing a Vibratory Conductor Sensor", No. 3,522,531, 4 Aug 70.

Publications (Last 5 years):

"Digital Logic Concepts and Combinational Logic Design", Chapter 36, pages 1-22, invited contribution for "The Mechatronics Handbook", CRC Press, 2002, Second Edition, **2007**, G. I. Cohn
"Digital Logic and Sequential Logic Circuits", Chapter 6, pages 40-57, invited contribution for "The Electronics Handbook", CRC Press, and IEEE Press, 1996, Second Edition, **2005**, G. I. Cohn

Scientific and Professional Societies:
1. Member, American Association for the Advancement of Science
2. Member, American Association of Physics Teachers
3. Member, American Mathematical Society
4. Member, American Physical Society
5. Member, Association for Computing Machinery
6. Senior Member, Institute of Electrical and Electronic Engineers
7. Member, Optical Society of America

Institutional and Professional service in the last five years:

Associate Editor, IEEE Transactions on Education

Percentage of Time committed to Research or Scholarly Activities
0%

Percentage of Time committed to the program
100%

Courses Taught This Year:

Fall 2011 Sick Leave
Spring 2012 Sick Leave

Joseph Costantine

Academic Rank: Assistant Professor, Electrical Engineering, Full-Time

Degrees Held: B.S., Electrical, Electronics, Computer and Communications Engineering, Lebanese University Branch II
M.E. In Computer and Communications Engineering, The American University of Beirut
Ph.D., In Engineering, The University of New Mexico

Service at CSUF: 2 Years

Date of Original Appointment: August 2010 Assistant Professor

Date of Advancement in Rank: August 2015

Other related Experience:

- **Nov. 2009- Present:** ***Consultant*****-**Energy Matter Conversion Corporation Fusion (EMC2 Fusion), Santa Fe, NM, USA
- **Dec.2009-July 2010:** ***Post-Doc Fellow***-Electrical and Computer Engineering Department-University of New Mexico, NM, USA

Patents:

- **J. Costantine**, Y. Tawk, C. G. Christodoulou, M. Rivera, T. Atwood" Failure Detection in Switch Reconfigurable Antenna Arrays" , Patent under review, 2012
- Y. Tawk, **J. Costantine**, C. G. Christodoulou " A Reconfigurable Filtenna", Patent Under review, 2012

Selected Publications (2011-2012):

- **J. Costantine**, S. al-Saffar, C. G. Christodoulou, C. T. Abdallah "Reducing Redundancies in Reconfigurable Antenna strutures Using Graph Models" ***IEEE Transactions on Antennas and Propagation***, Vol. 59, Issue 3,pp.793-801,2011
- Y.Tawk, **J. Costantine**, K. Avery, C. G. Christodoulou " Implementation of a Cognitive Radio Front-End Using Rotatable Controlled Reconfigurable Antenna" ***IEEE Transactions on Antennas and Propagation,*** Vol.59, Issue 5,pp.1773-1778, 2011
- **J. Costantine**, C.G.Christodoulou, J.C.Lyke, A. Grau, F. De Flaviis, S. E. Barbin "Analyzing the Complexity and Reliability of Switch-Reconfigured Antennas Using Graph Models" ***IEEE Transactions on Antennas and Propagation***, Vol.60, Issue 2, pp. 811-820, Feb. 2012
- Y. Tawk, **J. Costantine**, S. Hemmady, G. Balakrishnan, K. Avery, and C. G. Christodoulou, "Demonstration of a cognitive radio front-end using optically pumped reconfigurable antenna system (OPRAS)," ***IEEE Transactions on Antennas and Propagation,*** Vol.60, Issue 2, 1075-1083, Feb.2012
- **J. Costantine**, Y. Tawk, and C. G. Christodoulou, "Complexity versus reliability in arrays of reconfigurable antennas," *accepted for publication and to appear in the* ***IEEE Transactions on Antennas and Propagation,*** 2012
- **J. Costantine**, Y.Tawk, C. G. Christodoulou, J. Banik, S. Lane " CubeSat Deployable Antenna Using Bi-Stable Composite Tape Springs" *accepted for publication and to appear* in the ***IEEE Antennas and Wireless Propagation Letters***, 2012.
- Y. Tawk, **J. Costantine**, and C. G. Christodoulou, "A reconfigurable filter for cognitive radio applications," ***IEEE URSI National Radio Science Meeting***, Jan. 2012.

- Y. Tawk, **J. Costantine**, and C. G. Christodoulou, "The use of reconfigurable antennas in a cognitive radio environment," ***IEEE URSI National Radio Science Meeting***, Jan. 2012.
- A. Ramadan, M. Husseini, Y. Tawk, **J. Costantine**, C. G. Christodoulou, and K. Kabalan, "A frequency-tunable pattern diversity antenna for cognitive radio applications," ***IEEE URSI National Radio Science Meeting***, Jan. 2012.
- Y. Tawk, **J. Costantine**, and C. G. Christodoulou, "A Cognitive radio reconfigurable Filtenna," ***6th European Conference on Antennas and Propagation***, Mar. 2012.
- **J. Costantine**, Y. Tawk, A. Ernest, and C. G. Christodoulou, "Deployable antennas for CubeSat and space communications " ***6th European Conference on Antennas and Propagation***, Mar. 2012.
- A. Ramadan, M. Husseini, K. Kabalan, A. El-Hajj, Y. Tawk, C. Christodoulou, and **J. Costantine**, "A narrowband frequency-tunable antenna for cognitive radio applications," ***6th European Conference on Antennas and Propagation***, Mar. 2012.
- G. Olson, S. Pellegrino, **J. Costantine**, J. Banik "Structural Architectures for a Deployable Wideband UHF Antenna" accepted in the **53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference**, Apr. 2012
- M. J. Rivera, **J. Costantine**, Y. Tawk, and C. G. Christodoulou, "Detection of failures in switch reconfigurable antenna arrays using embedded sensing lines," *accepted in* ***IEEE International Symposium on Antennas and Propagation (APS-URSI),*** July 2012.
- A. Ernest, Y. Tawk, C. G. Christodoulou, and **J. Costantine**, "Deploying conical log-periodic antenna for cubesat applications," *accepted in* ***IEEE International Symposium on Antennas and Propagation (APS-URSI),*** July 2012.
- M. E. Zamudio, Y. Tawk, C. G. Christodoulou, and **J. Costantine**, "Embedding a reconfigurable band-pass/band-stop filter into an antenna," *accepted in* ***IEEE International Symposium on Antennas and Propagation (APS-URSI),*** July 2012.
- Y. Tawk, **J. Costantine**, S. Hemmady, and C. G. Christodoulou "An experimental setup for measuring the tuning time of an optically pumped reconfigurable antenna system," *accepted in IEEE* ***International Symposium on Antennas and Propagation (APS-URSI),*** July 2012.
- Y. Tawk, C. G. Christodoulou, **J. Costantine**, and S. E. Barbin, "A frequency and radiation pattern reconfigurable antenna with sensing capabilities for cognitive radio," *accepted in* ***IEEE International Symposium on Antennas and Propagation (APS-URSI),*** July 2012.
- Y. Tawk, **J. Costantine**, C. G. Christodoulou, and S. E. Barbin, "Two tilted reconfigurable printed monopoles," submitted to the ***IEEE International Conference on Electromagnetics in Advanced Applications*****,** Sept. 2012.

Selected Publications involving students' participation (2011-2012):

- **J. Costantine**, Y. Tawk, J. Himmelheber, M. Shiva, and C. G. Christodoulou, "A cognitive radio planar antenna system with a reconfigurable substrate height," ***IEEE URSI National Radio Science Meeting***, Jan. 2012.
- **J. Costantine**, E. Fucinari, A Kajikawa, M. Shiva, Y. Tawk, and C. G. Christodoulou, "Tuning of reconfigurable antennas by motion detection," *accepted in* ***IEEE International Symposium on Antennas and Propagation (APS-URSI),*** July 2012.
- **J. Costantine**, D. Tran, M. Shiva, Y. Tawk, C. G. Christodoulou, and S. Barbin, "A deployable Quadrifilar helix antenna for cubesat," *accepted in* ***IEEE International Symposium on Antennas and Propagation (APS-URSI),*** July 2012.
- **J. Costantine**, Y. Tawk, S. Moth, C. G. Christodoulou, and S. E. Barbin, "A modified helical shaped deployable antenna for cubesat," submitted to the ***IEEE-APS Topical Conference on Antennas and Propagation in Wireless Communications***, Sept. 2012.

Intramural Grants:

- **Spring 2011:** CSUF's FDC international Research and Creative Activity Reimbursement grant **-**1000$

- **Fall 2011:** CSUF's FDC Faculty –Student Research Grant to investigate the ambient electromagnetic fields in Orange County and San Diego -1000$
- **Spring 2012:** CSUF's FDC Faculty-Student Research Grant to design and develop deployable antennas for small satellites-1000$
- **Summer 2012:** State Special Fund-Junior Research Grant to design and develop antenna systems for cognitive radio-5000$
- **Fall 2013:** Incentive Grant to encourage external funding on Reconfigurable Wearable Antennas- 10000$

Extramural Grants:

- Reconfigurable Antennas for Space Communications- Proposal submitted to NSF in Collaboration with San Diego State University- pending
- A Deployable Log-Periodic Crossed Dipole Antenna Array For CubeSat Applications – Proposal submitted to the space vehicles directorate of the Air Force Research Lab as part of the small university grants program- pending
- Scaling of wideband deployable antennas for CubeSats- Proposal under preparation to be submitted to the Air Force Office of Scientific Research in Collaboration with California Institute of Technology (CALTECH)

Scientific and Professional Societies: Member of IEEE

Selected Honors and Awards:

- The 2nd IDGA Antennas West Conference, San Diego, CA, March 2012
- Recipient of the summer faculty fellowship program award with the space vehicles directorate at Kirtland Research Lab, Summer 2011
- Honored Speaker at the 8th IDGA Antennas Conference, Washington DC, September 2011
- Finalist position among 1000 papers in the best paper contest at the fifth European Conference on Antennas and Propagation- Antenna Applications Section, April 2011

Institutional and Professional service in the last five years:

- Member of the Electrical Engineering Department Assessment Committee
- Member of the Electrical Engineering Department Scheduling Committee
- Member of CSUF's Faculty Affairs Committee

Percentage of Time Available for Research or Scholarly Activities 10%

Percentage of Time committed to the program 90%

Courses Taught This Year:

Fall 2011

EGEE 469– Antennas for wireless communications
EGEE 485- Electrical Engineering Senior Design projects
EGGN 100- Introduction to Engineering - Two sections

Spring 2012

EGEE 435– Microwave Engineering
EGEE 485- Electrical Engineering Senior Design projects
EGEE 311- Field Theory and Transmission Lines

Shahin D. Ghazanshahi

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: B.S., Physics, University of Tehran, 1974
M.S., Physics, University of Tehran, 1976
M.S., Biomedical Engineering, University of Southern California,1981
Ph.D., Biomedical Engineering, University of Southern California, 1984

Service at CSUF: 27 Years

Date of Original Appointment: August 1985, Lecturer, Full-Time

Date of Advancement in Rank: August 1987, Assistant Professor
August 1992, Associate Professor
August 1997, Professor

Other related Experience:

Research with NASA/ GSFC and NASA/AMES Centers, 2009-now

Publications (Last 5 years):

- S.Ghazanshahi, E.H. Dowdye, “Shapiro Delay, Frequency Dependent Transit Time Effect; not a 4D Space-Time Effect”, Proceeding of SPIE, Optics + Photonics, San Diego, CA, August 2011
- S. Ghazanshahi, "System Identification Techniques For Formation Flying Telescope Arrays", proceeding of The International Multi Conference On Engineering and Technological Innovation, Pp. 277-301, Orlando, Florida, July 2010.
- E. H. Dowdye, S. Ghazanshahi, " An Ideal Inelastic Collision Model Using Center of Mass Frames Shows Conservation of Kinetic Energy", Proceeding of NPA, Pp. 150-158, Long Beach, California, 2010.
- J. Zadeh, S. Ghazanshahi, and Dennis Devoler, “Software Testing and Quality Insurance,” Proceeding of 12th World Multiconference on Systemics, Cybernetics, and Informatics, Orlando, FL., July 2008.

Grants

NASA-NSTI Grant, total of $100,000 for 3 years since 2009

Scientific and Professional Societies:

Member of IEEE
Member of ISA

Honors and Awards:

Sabbatical Leave Award , CSUF, Spring 2010
NASA-NSTI Stem faculty, 2009-now

Percentage of Time Available for Research or Scholarly Activities

15%

Percentage of Time committed to the program

85%

Courses Taught This Year:

Fall 2011

EGEE 203– Electric Circuits
EGEE 203l - Electric Circuit lab
EGEE 323- Engineering Probability and Statistics
EGEE 409 – Introduction to Linear System

Spring 2012

EGEE 203– Electric Circuits
EGEE 203l - Electric Circuit lab
EGEE 323- Engineering Probability and Statistics
EGEE 409 – Introduction to Linear System

Mohinder S. Grewal

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: B.S., Electrical Engineering, Punjab University
M.S., Electrical Engineering, University of California, Los Angeles
M. S., Applied Mathematics, University of Michigan, Ann Arbor
Ph.D., Electrical Engineering, University of Southern California, 1974

Service at CSUF: Thirty Seven Years

Date of Original Appointment: August 1975, Assistant Professor, Full Time

Date of Advancement in Rank: August 1979, Associate Professor
August 1983, Professor

Other related Experience:

1980-1987 – Chair, Department of Electrical Engineering, CSUF
1980-present—Instructor of professional short courses, including P.E.

Consulting, patents:

Patent: "Method and Apparatus for Wide Area Augmentation system Having GEO Uplink Subsystem with Enhanced Clock Steering." U.S. Patent 7286082, 10/23/2007.
Patent: "Method and Apparatus for Wide Area Augmentation System Having L1/L5 Bias Estimation." Publication No. WO/2007/037957, May 2007.
Registered Professional Engineer, State of California, CS 1398

Publications (Last 5 years):

Book: Second Edition: Global Positioning Systems, Inertial Navigation, and Integration, with MATLAB, Wiley & Sons, 2007. Co-authors Lawrence R. Weill and Angus P. Andrews.

Book: Kalman Filtering Theory and Practice Using MATLAB, Third Edition, Wiley & Sons, 2008. Co-authored with Angus P. Andrews (with CD).

"Space-Based Augmentation for Global Navigation Satellite Systems," IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, Volume 59, No. 3, March 2012, pp. 497-504.

"Kalman Filter Implementation with Improved Numerical Properties," IEEE Transactions on Automatic Control, with coauthor James Kain. Vol. 55, No. 9, September 2010.

"Applications of Kalman Filtering in Aerospace 1960 to the Present," with coauthor A. P. Andrews, IEEE Control Systems Magazine, Vol. 30, No. 3, June 2010, pp. 69-78.

"How Good is Your Gyro?" IEEE Control Systems Magazine "Ask the Expert Column." Vol. 30, No. 1, February 2010, pp. 12-14, 86.

"Application of Kalman Filtering to GNSS from 1960 to Present," with A.P. Andrews. Invited paper. Joint Conference of the IEEE International Frequency Control & European Frequency and Time Forum (FCS), May 1-5, 2011, pp. 254-260.

"Navigation Systems," Encyclopedia of Global Studies. Juergensmeyer, Mark and Anheier, Helmut (eds.), Sage Publications, 2011.

"Global Navigation Satellite Systems (GNSS)." Invited on- line encyclopedia article. *Wiley Interdisciplinary Reviews—Computational Statistics,* John Wiley & Sons, Inc., DOI:10.1002/wics, 158, 2011.

Grants

Scientific and Professional Societies:

Senior Member, IEEE, Society of Automatic Control
Member, Institute of Navigation (ION)
Fellow, Institute for Advancement of Engineering

Honors and Awards:

"2008-2009 Outstanding Professor Award" presented by California State University, Fullerton (CSUF).
"Distinguished Engineering Educator Award" presented by Orange County Engineering Council, 2009 Annual Engineers Week Awards, February 20, 2009.
CSUF Annual Author Awards, February 29, 2008, for *Second Edition of Global Positioning Systems, Inertial Navigation, & Integration*, with Lawrence R. Weill, and Angus P. Andrews, Wiley & Sons, 2007 and 3rd edition of Kalman Filtering book , Wiley and sons, 2008.

Institutional and Professional service in the last five years:

Graduate Advisor 2005-2011
Chair, College Curriculum Committee 2004-2011
Member, Faculty Senate, 2007-2009
Outstanding Professor Committee ,2010-2012
Member, PRBC, 2009-2012
Chair, DPC of Computer Engineering Program, 2003 -2009
Member, EE Department Personnel Committee, 2003- 2007
Chair, Department Curriculum Committee 2003-2011
Chair, Faculty Hiring Committee, 2006-2007

Percentage of Time Available for Research or Scholarly Activities 25%
Percentage of Time committed to the program 75%

Courses Taught This Year:

Fall 2011
EE 308- Engineering Math
EE 245 L – Logic Design Lab
EE 483 – Introduction to GPS
EE 580 – Analysis of Random Signals

Spring 2012
EE 308 – Engineering Math
EE 483 L – GPS Lab
EE 580 – Analysis of Random Signals

Karim Hamidian

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: B.S.,
M.S.,
Doctorate Degree in Electronics Engineering, University of Padova, Italy, 1981.

Service at CSUF: Twenty Eighth Years

Date of Original Appointment: August 1984. Lecturer, Full-Time

Date of Advancement in Rank: August 1987, Assistant Professor
August 1991, Associate Professor
August 1997, Professor

Other related Experience:

Supervised Several Graduate Level Projects and Theses:

1. Lee D." A New Method for Detection and Decoding of Multiple Input Multiple Output (MIMO) Communication Systems Using verilog." In progress.
2. Amorsolo M." Cycle Removing Algorithm for Low Density Prity Check Code," Graduate Thesis, 2009.
3. Dvarakonda S." Optimization of Voice Over Internet." Graduate Independent Research, Fall2005.

Consulting, patents:

Provided Lecture In Electronic Communications to a Group of Working Engineers At Monolithic Solutions, Inc. Irvine, 2009.

Publications (Last 5 years):

1." MIMO ML Detection Using a Novel Set Partitioning Approach, "in progress.
2. "Reducing The Complexity of Low Density Parity Check Code, " in progress.
3. Published Through CSUF Bookstore Lecture Notes for Students Use for the Following Courses: EE310, EE 442, EE 443, EE 460, EE 503, EE 522, EE 531 and EE 537.

Grants:

Scientific and Professional Societies:

Member of Electrical Engineering Honor Society: Eta Kappa Nu
Member of The Order of the Engineer

Honors and Awards:

"With Our Deepest Appreciation Thank You Dr. Hamidian for Your Tireless Efforts In Building Our Strong Foundation In Electrical Engineering," From a Group of Graduate Students, 2012

"In Recognition of Your 25 years of Distinguished Service to California State University Fullerton," 2010, From Dr. Milton Gordon, President.

"In Recognition of 20 Years Outstanding Service California State University Fullerton," 2005. From Dr. Milton Gordon, President.

Institutional and Professional service in the last five years:

Undergraduate/ Graduate Adviser, Member/ Chair of Scheduling Committee, Member of Department Personal Committee and Member of Oral Exam Committee

Percentage of Time Available for Research or Scholarly Activities

20%

Percentage of Time committed to the program

100% of Time

Courses Taught This Year:

Fall 2011

EGEE 442- Electronic Circuits
EGEE 443- Electronic Communication Systems
EGEE 522- Spread Spectrum Communications
EGEE 531 Phase lock Loop and Frequency Feedback

Spring 2012

EGEE 460- Introduction to Mobile Cellular Communications
EGEE 503- Information Theory and Coding
EGEE 507 Detection and Estimation Theory
EGEE 537 Satellite Communications

Hassan Hamidi-Hashemi

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: B.S., Electrical Engineering, University of Houston, 1971
M.S., Electrical Engineering, University of Houston, 1973
Ph.D., Systems Engineering, UCLA, 1977

Service at CSUF: 29 Years

Date of Original Appointment: August 1983, Lecturer, Full-Time

Date of Advancement in Rank: August 1985, Associate Professor
January 1993, Professor

Other related Experience:

Data & Voice Infrastructure

Consulting, patents:

None

Publications (Last 5 years):

None

Grants

None

Scientific and Professional Societies:

Member of IEEE
Member of ISA

Honors and Awards:

- Eta Kappa Nu
- Tau Beta Pi
- Meritorious Performance and Professional Promise Award
  California State University (CSUF), 1989
- Faculty Service Award
  California State University, (CSUF), 2009

Institutional and Professional service in the last five years:

Services to the EE Department at CSUF in the Last 5 Years:

- 2010-2011 Undergraduate Advisor, Graduate Advisor, Chair/Member of M.S. Oral Exams and Defense Committees

- 2009-2010 Chair of DPC, Chair of Scheduling Committee, Chair of Assessment Committee, Undergraduate Advisor, Graduate Advisor, Chair/Member of M.S. Oral Exams and Defense Committees
- 2008-2009 Chair of Chair Selection Committee, Chair of DPC, Chair of Scheduling Committee, Chair of Assessment Committee, Undergraduate Advisor, Graduate Advisor for the Field of Control Systems, Chair/Member of M.S. Oral Exams and Defense Committees
- 2007-2008 Chair of DPC, Chair of Scheduling Committee, Chair of Assessment Committee, Undergraduate Advisor, Graduate Advisor for the Field of Control Systems, Chair/Member of M.S. Oral Exams and Defense Committees
- 2006-2007 Chair of Assessment Committee, Graduate Advisor for the Field of Control Systems, Chair/Member of M.S. Oral Exams and Defense Committees

Percentage of Time Available for Research or Scholarly Activities

0

Percentage of Time committed to the program

100

Courses Taught This Year:

Fall 2011

EGEE 245L – Computer Logic & Architecture Laboratory
EGEE 401 - Engineering Economics & Professionalism
EGEE 526 - Digital Control

Spring 2012

EGEE 401 - Engineering Economics & Professionalism
EGEE 303L - Electronic Laboratory
EGEE 308 – Engineering Analysis
EGEE 416 - Feedback Control Systems

Jidong Huang

Academic Rank: Assistant Professor, Electrical Engineering, Full-Time

Degrees Held: B.S., Educational Technology, Central China Normal University, 1999
M.S., Computer Engineering, Chinese Academy of Sciences, 2002
Ph.D., Electrical Engineering, Ohio University, 2007

Service at CSUF: Five Years

Date of Original Appointment: August 2007, Lecturer, Full-Time

Other related Experience:

Jan. 2007 – Aug. 2007, GPS Software Design Engineer, NavCom Technology, Inc.

Publications (Last 5 years):

- "The CSUF Autonomous Lawnmower: Lessons learned from Modifying an Existing Lawnmower," J. Huang, M. Yeh, ION International Technical Meeting 2012, Newport Beach, CA, Jan 2012
- "Real-time Kinematic Differential GPS/INS Integration using Extended Kalman Filter," J. Huang, M. Grewal and J. Fayman, presented in IEEE/ION PLANS 2010, Palm Springs, CA, May 2010
- "A Carrier Phase Batch Processor for Differential Global Positioning System: Simulation and Real-Data Results," J. Huang, F. Van Graas, Measurement Science and Technology, September 2009
- "Characterization of Tropospheric Spatial Decorrelation Errors over a 5-km Short Baseline," J. Huang, F. Van Graas and C. Cohenour, Navigation: Journal of the Institute of Navigation, Vol. 55, No. 1, 2008
- "Comparison of Tropospheric Decorrelation Errors in the Presence of Severe Weather Conditions in Different Areas and Over Different Baseline Lengths," J. Huang and F. Van Graas, published in the Navigation: Journal of the Institute of Navigation, Vol. 54, No. 3, 2007

Scientific and Professional Societies:

Senior Member of Institute of Electrical and Electronics Engineers (IEEE);
Member of Institute of Navigation (ION)

Honors and Awards:

- Second Place, The undergraduate engineering and computer science category, the 24th annual California State University student research competition, San Jose, CA, May 2010
- First Place, The Third Annual Autonomous Lawnmower Competition, Institute of Navigation, Dayton, Ohio, Jun. 2006
- First Place, The Second Annual Autonomous Lawnmower Competition, Institute of Navigation, Dayton, Ohio, Jun. 2004
- Stocker Research Fellowship, School of Electrical Engineering and Computer Science, Ohio University, 2002-2004

Institutional and Professional service in the last five years:

Faculty Advisor (Assisting), Student Chapter of Institute of Navigation at CSUF

Percentage of Time Available for Research or Scholarly Activities

30%

Percentage of Time committed to the program

100%

Courses Taught This Year:

Fall 2011

- EGCP/EE 280 – Microcontrollers
- EGEE 215 – Solving Engineering Problems using MATLAB
- EGEE 404 – Introduction to Microprocessors & Microcomputers
- EGGN 403 – Computer Methods in Numerical Analysis

Spring 2012

- EGEE 215 – Solving Engineering Problems using MATLAB
- EGEE 281 – VHDL & Digital Design
- EGGN 403 – Computer Methods in Numerical Analysis
- EGEE 558B – Microprocessor System & Applications

Young D. Kwon

Academic Rank: Professor, Electrical Engineering

Degrees Held: Ph.D. Electrical Engineering, University of New Mexico, 1966
M.S. Electrical Engineering, Seoul National University, Seoul, Korea, 1962
B.S. Electrical Engineering, Seoul National University, Seoul, Korea, 1958

Service at CSUF: 38 years

Date of Original Appointment: September 1969, Assistant Professor

Dates of Advancement in Rank: September 1972, Associate professor.
September 1978, Professor

Department Chairperson: 1988-1992

Other related Experience:

1978-1980 Technical Director, Korea Institute of Electronics Technology, Kumi, Korea
1967-1969 Member of Technical Staff, Bell Telephone Laboratories
1966-1967 Senior Engineer, Motorola Semiconductor Division
1963-1966 Graduate Assistant, University of New Mexico
1958-1963 Engineer, Korea Electric Power Company, Seoul, Korea

Consulting, patents:

U.S. Patent #4171503 "Electrodeless Fluorescent Lamp" 1979
U.S. Patent #D247701 "Digital Calendar Watch" 1978
Japanese Patent #495084, #495085 1978
Japanese Patent #468970, #468971 1978
U.S. Patent #D235520 "Digital calendar watch" 1975

Publications (Last 5 years):

Y.D. Kwon, “Theory of the screened Coulomb field generated by impurity ions in semiconductors”, Physical Review B 73, pp165210-1-9, April, 2006

Scientific and Professional Societies:

Sigma Xi
KSEA (Korean Scientists and Engineers Association)
IEEE

Institutional and Professional service in the last five years:

Personnel Committee , EE department 2006-7 School year
Personnel Committee , CS department 2006-7 School year
Graduate project advisor, Fall, 2008

Percentage of Time Available for Research or Scholarly Activities

50

Percentage of Time committed to the program

50

Courses Taught This Year:

Fall 2011

EGCP/EE 523A-VLSI and Nano Devices and Technology
EGCP/EE465- Introduction to VLSI design

Spring 2012

EGCP/EE 523B CMOS VLSI Design
EGCP/EE 203L Electric Circuits Laboratory

Mostafa Shiva

Academic Rank: Professor, Electrical Engineering, Full-Time

Degrees Held: B.S. Electrical Engineering, Tehran University, 1976

M.S., Electrical Engineering, Communication, University of Southern California, 1977

Ph.D., Electrical Engineering, MS, Electrical Engineering, University of Southern California, 1982

Service at CSUF: 30 Years

Date of Original Appointment: August 1982, Lecturer, Full-Time

Date of Advancement in Rank: August 1983, Assistant Professor
August 1986, Associate Professor
August 1995, Professor

Other related Experience:

2001 – Present, Chair, Department of Electrical Engineering, CSUF.
1992 – Present, University of Southern California, EE Department, Adjunct Professor

Consulting, patents:

Book Review for McGraw Hill: January 2006, Digital Signal Processing
Book Review for Elsevier: December 2007, Digital Signal Processing, W. E. Alexander

Publications (Last 5 years):

J. Costantine, Y. Tawk, J. Himmelheber, M. Shiva, and C. G. Christodoulou, "A cognitive radio planar antenna system with a reconfigurable substrate height," *IEEE URSI National Radio Science Meeting*, Jan. 2012.

J. Costantine, E. Fucinari, A Kajikawa, M. Shiva, Y. Tawk, and C. G. Christodoulou, "Tuning of reconfigurable antennas by motion detection," *accepted in IEEE International Symposium on Antennas and Propagation (APS-URSI),* July 2012.

Grants

None

Scientific and Professional Societies:

Member of IEEE
Associate Member of SEG

Honors and Awards:

CSUF, April 9, 2008, **Outstanding Faculty Recognition for Teacher Scholars award** for Exceptional Teaching Effectiveness. Presented by the Vice President for Academic Affairs.

Institutional and Professional service in the last five years:

- University Minority Access to Research Careers (MARC) Program Steering Committee (2006 – present)
- University Planning Committee (2004-05)
- Member/Chair, Electrical Engineering ABET Committee (2000 – present)
- Graduate and Undergraduate Adviser
- Chair/Member MS Oral Exam Committee

Percentage of Time Available for Research or Scholarly Activities

10

Percentage of Time committed to the program

100

Courses Taught This Year:

Fall 2011

EGEE 313L – Power Laboratory
EGEE 518 – digital Signal Processing.

Spring 2012

EGEE 313L – Power Laboratory
EGEE 420 – Introduction to Digital Filters

Fleur T. Tehrani

Academic Rank: Professor, Electrical Engineering, Full time

Degrees Held: B.S., Electrical Engineering, Arya-Mehr (Sharif) University of Technology, 1975
DIC, Communication Engineering, Imperial College of Science & Technology, University of London, 1977
M.S., Communication Engineering, University of London, 1977
Ph.D., Electrical Engineering (Emphasis on systems and control engineering and their applications in biological systems), University of London,1981

Service at CSUF: 27 Years

Date of Original Appointment: August 1985, Assistant Professor
Date of Advancement in Rank: August 1991, Associate Professor
August 1994, Full Professor

Consulting: 1997- Present, Consultant, Biodyne Engineering, Anaheim, California.

Professional License: 1993-Present, Registered Professional Engineer in Electrical Engineering, California License# E014242

Patents (Last 5 years):

1. Tehrani FT. Method and Apparatus for Controlling a Ventilator. UK Patent No. GB2423721, Granted 14 October, 2008.
2. Tehrani, FT, Method and Apparatus for Controlling a Ventilator, New Zealand Patent No. 546941, Granted January 2009.
3. Tehrani, FT, Australian Patent No. 2004292955, Method and Apparatus for Controlling a Ventilator, issued on June 3, 2010.
4. Tehrani, FT, US Patent No. 7,802,571, Method and Apparatus for Controlling a Ventilator, issued on September 28, 2010, utility type patent.
5. Tehrani, FT, Canadian Patent No. 2545570, Method and Apparatus for Controlling A Ventilator, issued January 3, 2012.

Publications (Last 5 years):
Book Chapters

1. Tehrani, FT, FLEX: A new weaning and decision support system, , In: Applied Technologies in Pulmonary Medicine, Esquinas, AM, (Ed.), pp. 39-45, Karger, AG, Basel, 2010.
2. Tehrani FT, Automatic control of mechanical ventilation technologies, In: Applied Technologies in Pulmonary Medicine, Esquinas, AM, (Ed.), pp. 28-34, Karger, AG, Basel, 2010.
3. Tehrani, FT, Computerized decision support systems for mechanical ventilation, In: Efficient Decision Support Systems: Practice and Challenges in Biomedical Related Domain, Chiang Jao, Ed., INTECH Open Access Publisher, pp. 227-238, Sept. 2011.

Published Refereed and Peer-Reviewed Articles:

1. Tehrani, F. T., "A New Decision Support System for Mechanical Ventilation," Proceedings of the International Conference of *IEEE Engineering in Medicine & Biology Society,* vol. 29, August 2007.
2. Tehrani, FT, Roum, JH, "FLEX: a new computerized system for mechanical ventilation," *Journal of Clinical Monitoring and Computing,* Vol. 22, no. 2, 2008.
3. Tehrani, FT, Roum, JH, "Intelligent decision support systems for mechanical ventilation," *Artificial Intelligence in Medicine,* Vol. 44, no. 3, 2008.

4. Tehrani, FT, “Automatic control of mechanical ventilation. Part 1: Theory and history of the technology,” *Journal of Clinical Monitoring and Computing,* Vol. 22, no. 6, 2008.
5. Tehrani, FT, “Automatic control of mechanical ventilation. Part 2: The existing techniques and future trends,” *Journal of Clinical Monitoring and Computing,* Vol. 22, no. 6, 2008.
6. Tehrani, FT., Abbasi, S., “Evaluation of a computerized system for mechanical ventilation of infants,” *Journal of Clinical Monitoring and Computing*, Vol. 23, no. 2, 2009.
7. Tehrani, FT, Roum, JH, “Intelligent decision support systems for mechanical ventilation,” *IMIA Yearbook 2009*, (selected as one of the best articles in medical informatics in 2009)
8. Tehrani, FT, Critiquing treatment and setting ventilatory parameters by using physiological modeling, Proceedings of the International Conference of *IEEE Engineering in Medicine & Biology Society,* Volume 31, September 2009.
9. Tehrani, FT, Abbasi, S., The role of physiological models in critiquing mechanical ventilation treatments, *J. Clin Monit Comput,* Vol. 25, February 2011.

Scientific and Professional Societies:

- Fellow, The Institution of Engineering and Technology (IET), formerly known as the Institution of Electrical Engineers (IEE)
- Fellow, Institute for the Advancement of Engineering
- National Life Member, Sigma Delta Epsilon, Graduate Women in Science, Inc.
- Senior Member, The Institute of Electrical and Electronics Engineers (IEEE), IEEE Society of Engineering in Medicine and Biology

Honors and Awards (Last 5 years):

- 2007 Keynote speaker, 18th Annual Conference of Graduate Women in Science, Chapman University, Orange, California, March 2007.
- 2007 National Science Foundation Invited Expert Panelist in Biomedical Engineering.
- 2008 Invited Reviewer for the American Association for the Advancement of Science (AAAS).
- 2009 Selected as the author of one of the best articles in medical informatics in 2009 By the International Medical Informatics Association, IMIA.
- 2007 to present: Co-Chair, the International Conference on Computational Biology of the International Association of Engineers.
- 2012 Invited Reviewer for the National Institute of Health

Institutional and Professional service in the last five years:

- Member, University Library Committee, 2008-2010
- Member, Department Curriculum Committee, 2010-present
- Chair or Member of Ms. Thesis/Oral Exam Committees

Percentage of Time Available for Research or Scholarly Activities: 50%

Percentage of Time committed to the program: 100

Courses Taught This Year:

Fall 2011:

EE203L, Electric Circuits Lab
EE245, Computer Logic and Architecture
EE303, Electronics; EE309, Network Analysis

Spring 2012:

EE203, Electric Circuits
EE309, Network Analysis
EE303, Electronics
EE245L, Computer Logic and Architecture Lab.

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Appendix 8. List of Electrical Engineering Courses

EGEE 203 Electric Circuits (3)
Prerequisites: Physics 226, Math 250A; Prerequisite or Corequisite: CPSC 120 (or EGME 205). Units; Ohm's and Kirchoff's laws; mesh and nodal analysis; superposition; Thevenin and Norton theorems; RL and RC transients, phasors and steady-state sinusoidal analysis; response as a function of frequency; current voltage and power relationships; polyphase circuits.

EGEE 203L Electric Circuits Laboratory (1)
Prerequisite or Corequisite: EGEE 203. Simple resistive RL and RC circuits, electrical measurement techniques, verification of basic circuit laws through hard-wired breadboarding and CAD circuit simulation. (3 hours lab).

EGEE 215 Solving Engineering Problems using MATLAB (1)
Prerequisite: CPSC 120. Formulating, solving, verifying, and reporting engineering problems such as control, signal processing, and communication systems and engineering, math, and physics problems such as engineering/scientific computations and operations research using the MATLAB/Simulink program. (3 hour laboratory)

EGEE 245 Computer Logic and Architecture (3)
Prerequisites CPSC 120 or equivalent. Logical design and organization of the major components of computer, analysis and synthesis of combinatorial and sequential logics, analysis of the arithmetic, memory control and I/O units, concepts in computer control.

EGEE 245L Computer Logic and Architecture Lab (1)
Prerequisite or Corequisite: EGEE 245. Computer-Aided Design (CAD) of digital logic circuits including decoders, multiplexes, adders and subtracters, counters, shift registers and Arithmetic Logic Unit (ALU) of a computer. After verifying the CAD design through simulation, the circuits are built on a protoboard. (3 hours laboratory).

EGEE 280 Microcontrollers (3)
Prerequisite: EGCP 180 (or EGEE 245). Functional hardware components and software models of microcontrollers, microcontroller programming, interfacing microcontrollers with external devices.

EGEE 281 Designing with VHDL (2)
Prerequisites: CPSC 120 (or CPSC 121) and EGCP 180 (or EGEE 245). Use of VHDL (the standard language for design and simulation of digitals systems) for modeling, timing, events, propagation delays, and concurrency. VHDL construction, data representation, formats, physical attributes. Hands-on synthesis, simulation, and testing of digital projects.

EGEE 303 Electronics (3)
Prerequisites: Physics 227 and EGEE 203. Characteristics and elementary applications of semiconductor diodes, field-effect transistors and bipolar-junction transistors, and operational amplifiers; mid-frequency small-signal analysis and design of transistors.

EGEE 303L Electronics Laboratory (1)
Prerequisites: Engl 101, EGEE 203L. Corequisite: EGEE 303. Semiconductor diodes, transistors and elementary electronic circuits. (3 hours laboratory).

EGEE 308 Engineering Analysis (3)
Prerequisites: Physics 226, Math 250B or equivalent. Fundamentals and engineering applications of Fourier series, Fourier transforms, Laplace transforms, complex analysis, vector analysis; engineering applications.

EGEE 309 Network Analysis (3)
Prerequisites: EGEE 203 and EGEE 308. Prerequisite or Corequisite: EGEE 203L. Performance of RLC circuits; complex frequency and the s-plane; frequency response and resonance; network topology; two-port network characterization; classical filter theory.

EGEE 310 Electronic Circuits (3)
Prerequisites: EGEE 303, 309. Continuation of 303, analysis and design of multistage and feedback amplifiers; frequency characteristics of amplifiers, frequency characteristics and stability of feedback amplifiers, differential amplifiers, design of IC circuit biasing, operational amplifiers and their applications.

EGEE 310L Electronic Circuits Lab (1)
Prerequisite: EGEE 303L. Prerequisite or Corequisite: EGEE 310. Computer-Aided Design (CAD) of electronic circuits including multi-stage feedback amplifiers; linear and integrated circuits; ADC and DAC and wireless design projects. After verifying the CAD design through simulation, the circuits are built on a protoboard. (3 hours laboratory).

EGEE 311 Field Theory and Transmission Lines (3)
Prerequisites: Physics 226 and Math 250B, EGEE 203. Introduction to waves and phasors; analysis and design of transmission lines; electro-statics and magnetostatics; boundary value problems; Maxwell equations.

EGEE 313 Introduction to Electromechanics (3)
Prerequisites: EGEE 309 and 311. Electromagnetic fields and circuits; transformers saturation effects. Simple electro-mechanical systems. Circuit models, terminal characteristics and applications of DC and AC machines.

EGEE 313L Power Laboratory (1)
Prerequisite: EE 303L. Prerequisite or Corequisite: EGEE 313. Experiments in electromagnetic fields and circuits, transformers, and electromechanical systems such as AC and DC machines. (3 hours laboratory).

EGEE 323 Engineering Probability and Statistics (3)
Prerequisite: Math 250A. Set theory: axiomatic foundation of probability; random variables; probability distribution and density functions; joint, conditional, and marginal distributions; expected values; distribution of functions of random variables; central limit theorem; estimation.

EGEE 401 Engineering Economy and Professionalism (3)
Prerequisite: Math 150A and junior or senior standing. Development and presentation of design alternatives for engineering systems and projects using principles of engineering economy and cost benefits analysis. Study of engineering profession, professional ethics, and related topics. (Not available for use on graduate study plan).

EGEE 404 Introduction to Microprocessor and Assembly Language (3)
Prerequisites: EGEE 245L and 280. Hardware and software concepts in microprocessors, processor family chips, system architecture, CPU, input/output devices, interrupts and DMA, memory (ROM, RAM), electrical and timing characteristics, assembly language programming.

EGEE 404L Microprocessor Laboratory (1)
Prerequisites: 245L. Prerequisite or Corequisite: EGEE 404. I/O interfacing with a microprocessor system; familiarization with the operating system, assembler, debugger and emulator; design of keyboard, LCO display, PS 232, D/A converter, A/D converter and floppy disk interfaces. (3 hours laboratory).

EGEE 406 Design Application with Microcontroller and FPGA (3)
Prerequisite: EGEE 245, 245L and 280. Digital system application design using microcontrollers, FPGAs and CPLDs including programming, hardware interfacing, A/D conversion, CLB, logic arrays, interconnections, testing and simulations.

EGEE 407 Digital Computer Architecture & Design I (3)
Prerequisite: EGEE 245L and 280. Organization and design of the major components of a digital computer including the arithmetic, memory, input, output and control units. Integration of the units into a system and simulation by a computer design language.

EGEE 407L Digital Computer Architecture & Design Lab (3)
Prerequisites: EGEE 245L, 303L, 407. Design and implementation of a small digital computer; adders, arithmetic unit, memory control unit, memory unit and program unit. May be taken in lieu of 485. (1 hour lecture, 6 hours laboratory).

EGEE 409 Introduction to Linear Systems (3)
Prerequisites: EGEE 309. Development of time and frequency domain models for physical systems. The linearization process and representation with block diagrams and signal flow graphs; discrete-time systems and digital signals including use of Z-transforms;
stability theory of continuous and discrete time systems.

EGEE 410 Electro-Optical Systems (3)
Prerequisite: EGEE 311. Introduction to electro-optics; optical radiation characteristics and sources; geometrical and physical optics; lasers and electro-optical modulation; quantum and thermal optical radiation detectors; detector performance analysis; electro-optical systems modeling and analysis; application examples.

EGEE 412 Computer Architecture and Design II (3)
Prerequisites: EGEE 407. Modern architectures from micro and mini-computer to large scale systems, their CPU structures, memory hierarchies and I/O processors such as micro-programming cache and virtual memories, DMA, interrupts and priority.

EGEE 416 Feedback Control Systems (3)
Prerequisite: EGEE 409. Feedback control system characteristics; stability in the frequency domain; analysis and design of continuous-time systems using root-locus, Bode and Nyquist plots and Nichols chart.

EGEE 420 Introduction to Digital Filtering (3)
Prerequisites: EGEE 409. Discrete-time signals and systems; solution of difference equations; Fourier transform for a sequence; Z-transform; discrete Fourier transform; FIR and IIR realizations; design of digital filters.

EGEE 424 Computer Simulation of Continuous Systems (3)
Prerequisites: CPSC 120 and EGEE 215 and 308. Use of the digital computer for simulation of physical systems modeled by ordinary differential equations; problem formulation, in-depth analysis of two integration methods, and the use of a general purpose system simulation program such as CSSL.

EGEE 425 Introduction to Systems Engineering (3)
Prerequisites: EGEE 245 and EGEE 323 (or CS 240 and Math 338 for Computer Science Majors). Introduction to systems engineering analysis and the systems approach; introduction to modeling, optimization, design and control; systems requirements analysis; analytical and computational solution methods; information processing; integrated systems.

EGEE 430 Fuzzy Logic and Control (3)
Prerequisite: EGEE 409. Fuzzy logic and systems; comparison of classical sets, relations, and operators with fuzzy sets, relations and operators; fuzzy arithmetic and transformations; classical predicate logic and reasoning versus fuzzy logic and approximate reasoning. Applications to rule-based systems and control systems.

EGEE 435 Microwave Engineering (3)
Prerequisite: EGEE 311. This course provides essential fundamentals for RF, wireless and microwave engineering. Topics include: wave propagation in cables, waveguides, and free space; impedance matching, standing wave ratios, impedance and scattering parameters.

EGEE 442 Electronic Circuits (3)
Prerequisite: EGEE 310. Continuation of EGEE 310. Power amplifiers and tuned amplifiers; RF amplifiers; modulation and detection circuits; oscillators; and operational amplifier applications.

EGEE 443 Electronic Communication Systems (3)
Prerequisites: EGEE 310 and 323. Principles of amplitude, angular and pulse modulation, representative communication systems, the effects of noise on system performance.

EGEE 445 Digital Electronics (3)
Prerequisites: EGEE 245 and EGEE 303. RC circuits, attenuators, compensation and scope probe. Logic circuits: DTL, TTL, STTL, LSTTL and ECL. Fanout, noise-immunity, switching speed, power consumption, input-output characteristics. Design and analysis of MOS logic circuits; PMOS, NMOS and CMOS gates, flip-flops, shift registers and memory circuits.

EGEE 448 Digital Systems Design with VHDL (3)
Prerequisites: EGEE 245, 281, and 303. Basic concepts and characteristics of digital systems, traditional logic design, LSI/VLSI logic design with VHDL, combinational and sequential logic, and their applications: timing and control, race conditions and noise, microcomputers, computer-aided programming, development systems, microcomputer system hardware design, input/output devices.

EGEE 455 Microelectronics and Nano Devices(3)
Prerequisites: EGEE 303 and 311. Quantum mechanical principles, crystal structure, energy brand, carrier transport, carrier generation and recombination, p-n junction, bipolar transistor, MOSFET, MEFET and related devices, basic microwave and optoelectronic technology, crystal growth and fabrication, introduction to nano structure, nano devices and technology.

EGEE/EGCP 456 Introduction to Logic Design in Nanotechnology (3)
Prerequisite: EGEE 245 or EGCP 180. Survey of promising novel Nanoelectronic technologies and logic primitives for such technologies, applicable basic logic design technique, design models for spatial dimensions, applicable word-level data structures, multilevel circuit design, testability and observability, tolerance and reliable computing. (Same as EGCP 456).

EGEE 460 Introduction to Cellular Mobile Communications Systems
Prerequisite: EGEE 443 or equivalent. Introduction to wireless mobile telecommunications. Description and analysis of cellular radio systems. Co-channel Interference reduction. Channel capacity and digital cellular systems.

EGEE/EGCP 461 Low Power Digital IC Design (3)
Prerequisite: EGEE 245 or EGCP 180 and EGEE 303. Importance of low power design; analysis of power dissipation in digital integrated circuits; circuit-level low-power techniques, logic-level low-power techniques, and system-level low-power techniques. (Same as EGCP 461).

EGEE 465 Introduction to VLSI Design (3)
Prerequisites: EGEE 245 and EGEE 303. Computer aided design of VLSI circuits. MOS device structure, design rules, layout examples, CMOS standard cells. Speed power trade off, scaling, device and circuit simulation. VLSI design software tools. Routing method system design, Design Project. Chip fabrication through MOSIS service, testing

EGEE 469 Antennas for Wireless Communications (3)
Prerequisites: EGEE 311. Aspects of antenna theory and design; radiation from dipoles, loops, apertures, microstrip antennas and antenna arrays.

EGEE 480 Optical Engineering and Communications (3)
Prerequisite: EGEE 311 and Physics 227. Optics review, lightwave fundamentals, integrated optic waveguides, first design of fiberoptic system, analog and digital modulation, digital fiberoptic system design, baseband coding, digital video transmission in optical fiber, optical emitters and receivers, coherent optical communication, measurements in fiberoptic telecommunication.

EGEE 483 Global Positioning Systems (3)
Prerequisite or Corequisite: EGEE 409 (or EGCP 371).
Description of Global Positioning System (GPS) and Differential Global Positioning System (DGPS), GPS navigation, errors. Satellite signals and coordinate transform math. Modeling for position and velocity. Application to navigation.

EGEE 483L Global Positioning System Lab (2)
Prerequisite or Corequisite: EGEE 483. Use and description of Novatel, Magelon, Ahstek, Collins and Tribel receivers. Computation of GPS and GEO stationary satellite positions from ephemeris data available on almanac. Errors such as selective availability, ionospheric, tropospheric, satellite ad receiver will be calculated and compensated in the data. (1 hour lecture, 3 hours laboratory)

EGEE 485 Electrical Engineering Design Projects Laboratory (3)
Prerequisites: EGEE 280, 310L, and 323. The practical aspects of design and project construction. Instructor-approved design project in electrical engineering, inter-disciplinary projects. Use of CAD program for schematic capture and simulation. Construction of final hardware according to the design specification. Performance evaluation and demonstration of project. (1 hour lecture, 6 hours laboratory).

EGEE 497 Senior Project (1 – 3)
Prerequisite: Consent of adviser and instructor. Directed independent design project.

EGEE 499 Independent Study (1 – 3)
Prerequisite: Approval of study plan by adviser. Specialized topics in engineering selected in consultation with and completed under the supervision of the instructor. May be repeated for credit.

EGEE 503 Information Theory and Coding (3)
Prerequisite: EG-EE 323. Information measures probabilistic studies of the transmission and encoding of information, Shannon's fundamental theorems, coding for noisy channels.

EGEE 504A Linear Network Synthesis (3)
Prerequisite: EG-EE 310. Synthesis of passive element driving-point and transfer-functions with emphasis on RC networks. Basic operational amplifier RC circuits and their performance limitations, introduction to second-order RC active filters. Parameter sensitivity analysis.

EGEE 507 Detection Theory (3)
Prerequisite: EG-EE 580. Formulation of decision rules for the detection of signals in a noisy environment, optimum receivers. Estimation of parameters of detected signals. Estimation theory.

EGEE 510 Optics & Electromagnetics in Communication (3)
Prerequisite: EG-EE 480. Plane-wave propagation and reflection from multiple layers; two- and three-dimensional boundary value problems; waveguides and resonant cavities; radiation from apertures and antennas; electromagnetic properties of materials, gases and plasmas; significant coverage of engineering applications.

EGEE 518 Digital Signal Processing (3)
Prerequisites: EG-EE 420. Discrete Fourier transform; fast Fourier transform; Chirp Z-transform; discrete time random signals; floating-point arithmetic; quantization; finite word length effect in digital filters; spectral analysis and power spectrum estimation

EGEE 519A Parallel and Multiprocessing (3)
Prerequisite: EG-EE 412: Parallel and Multiprocessing systems including hypercubes; shared distributive memory architectures, array and pipeline processors, communication protocols, routing algorithms and hands-on parallel programming experience on CSUF Hypercube System.

EGEE 519B Computer Networks and the Internet (3)
Prerequisite: EG-EE 412. Computer networking with LAN, WAN to the Internet including ATM, Ethernet, Wireless and Blue Tooth technology, design of communication protocols, transmission media, security and control.

EGEE 522 Spread Spectrum Communications (3)
Prerequisites: EG-EE 443 and 580. Introduction to Spread Spectrum (SS) Systems. Performance analysis of coherent digital signaling schemes. Synchronization. Direct sequence, frequency hopping, time hopping, and Hybrid Spread Spectrum Modulations. Binary shift register sequences. Code tracking loops. Performance of SS systems in a jamming environment, with forward error correction.

EGEE 523A VLSI and Nanotechnology and Devices (3)
Prerequisite: EG-EE 455 or equivalent. Silicon crystal, PN junction physics, oxide and interface physics, wafer fabrication technologies: oxidation, diffusion, ion implantation, epilaxy, photolithography, thin film process. Layout design principles for integrated circuits. Nano-electronic devices and technology.

EGEE 523B CMOS VLSI Design (3)
Prerequisites: EG-EE 448 and EG-EE 465. Surface physics of MOS system, MOS device physics. Short channel effect; hot carrier effect, subthreshold conduction. CMOS fabrication process. Layout design rules. Scaling design and analysis of CMOS circuits. Standard cell method. CAD design and SPICE simulations.

EGEE 526 Digital Control Systems (3)
Prerequisite: EG-EE 416. Analysis, design and implementation of digital control systems; Z-transform methods; frequency domain and state-space approach for discrete-time systems.

EGEE 527 Fault Diagnosis and Fault-Tolerant Design (3)
Prerequisite: EG-EE 407. Fault diagnosis and fault-tolerant design of digital systems; fault diagnosis test for combinational and sequential circuits, reliability calculations, multiple hardware redundancy, error detection and correcting codes, software redundancy and fault-tolerant computing.

EGEE 529 Principles of Neural Systems (3)
Prerequisites: EE-GE 310 and 409. Principles of neural systems, their hardware implementation. Basic properties, discrete and continuous bi-directional associative memories. Temporal associate memories. Neural nets classifiers, perceptrons, supervised and unsupervised learning. Forward and backward propagation.. Electrical models of neural networks using op-amp., analog VLSI.

EGEE 531 Phase-Locked and Frequency Feedback Systems (3)
Prerequisite: EG-EE 580 or consent of instructor. Theory of noise and linear systems, FM feedback principles. Theory and design of phase-locked loops and their applications in communication and control.

EGEE 537 Satellite Communications (3)
Prerequisite: EG-EE 443. Satellite systems, link analysis, propagantion effects, SNF/CNR calculations, modulation schemes, TDMA, FDMA, CDMA techniques.

EGEE 557 Microprogramming and Embedded Microprocessors (3)
Prerequisite: EG-EE 412 and EGEE 448. An introduction to microprogramming concepts and applications to the control unit of a computer, microprogrammable control, arithmetic-logic unit, implementation of an embedded processor on FPGA and interfacing with the external memories.

EGEE 558A Microprocessors & Systems Applications I (3)
Prerequisites: EG-EE 404 and 404L. Microprocessors and microcomputers, their related software systems, system design with microprocessors, applicant in peripheral controllers, communication devices and multiprocessing systems.

EGEE 558B Microprocessors and Systems Applications II (3)
Prerequisite: EG-EE 558A. Advanced microprocessor architecture and their applications to microcomputer networking; RISC VS CISC architectures, communication protocol, distributed-operating system, and local area networks.

EGEE 559 Introduction to Robotics (3)
Prerequisite: Prerequisite: EG-EE 416 or consent of instructor. The science of robotics from an electrical engineering standpoint, including modeling, task planning, control, sensing and robot intelligence.

EGEE 580 Analysis of Random Signals (3)
Prerequisites: EG-EE 323 and 409 or equivalent. Random processes pertinent to communications, controls and other physical applications, Markov sequences and processes, the orthogonality principle.

EGEE 581 Theory of Linear Systems (3)
Prerequisites: EG-EE 416 and EGGN 403. State space analysis, linear spaces, stability of systems; numerical methods of linear systems analysis and design.

EGEE 582 Linear Estimation Theory (3)
Prerequisites: EG-EE 580 and 581. Mathematical models of continuous-time and discrete-time stochastic processes; the Kalman filter, smoothing and sub-optimal filtering computational studies.

EGEE 585 Optimization Techniques in Systems Engineering (3)
Prerequisite: EG-GN 403 or Math 340 for CPSCI majors. Calculus of variations, optimization of functions of several variables, Lagrange multipliers, gradient techniques, linear programming and the simplex method, nonlinear and dynamic programming.

EGEE 587 Operational Analysis Techniques in Systems Engineering (3)
Prerequisites: EG-EE 323 or Math 338 for CPSCI majors. Operational research models; applications or probability theory to reliability, quality control, waiting line theory, Markov chains; Monte Carlo methods.

EGEE 588 Systems Engineering Process and its Management (3)
Definition of systems, systems engineering process and lifecycle, basic concepts of system design, modeling using IDEFO, discrete mathematics and graph theory, requirements analysis, architecture development, interface design, system integration.

EGEE 597* Project (1-3)
Note: EE 597 cannot be taken if EE 598 or EE 599 is already taken.
Prerequisite: Consent of adviser. Classified graduate students only.

EGEE 598* Thesis (1-6)
Note: EE 598 cannot be taken if EE 597 is already taken.
Prerequisite: Consent of adviser. Classified graduate students only.

EGEE 599* Independent Graduate Research (1-3)
Note: EE 599 cannot be taken if EE 597 is already taken.
Prerequisite: Consent of adviser. May be repeated for credit upon approval of adviser and Department Chair.

*** Note: An Application for Independent Study must be submitted and approved by the instructor and the department chair BEFORE registering for these courses.**

Appendix 9. Syllabi of Electrical Engineering 500-Level Courses

EG-EE 503 - INFORMATION THEORY AND CODING (3)

INSTRUCTOR: K. Hamidian; Office - E 217, Telephone 278-2884
Fax: 278-7162, E-mail: khamidian@fullerton.edu
Office Hours: MW 1600-1730, TTH 2015-2045

PREREQUISITES: EE 323 - Information measures, probabilistic studies of the transmission and encoding of information, Shannon's fundamental theorems, coding for noisy channels.

TEXT: 1) Digital Transmission Theory, S. Benedetto, V. Castellani, Prentice Hall, 1987.
2) Digital Communications Fundamentals and Applications, by B. Sklar, Second Edition, Prentice Hall, 2001.

REFERENCES:
1) Digital Communicaon and Coding, A. J. Viterbi, J. K. Omura, McGraw Hill, 1979
2) Digital Communications, J. Proakis, McGraw Hill, 1989, Second Edition
3) Coding and Information Theory, R. W. Hamming, Prentice Hall, 1986.

TENTATIVE COURSE OUT

Weeks — Chapters 2, 3 (TEXT #1)
Sections: 2.2, 3.1 - 3.3 + handouts

5.0 TOPICS: Information Theory
Model of a Digital Communication System. Discrete-Time Processes, Measure of Information, Entropy and Mutual Information. Source, Source Models, and Source Encoding. Channel Models, Shannon's Theorem, and Channel Capacity.

EXAM# 1 (75 Min.)

Chapter 6 (Text #2) + handouts
Sections: 6.1 - 6.9

5.0 TOPICS: Channel Coding Part 1
Waveform Coding, Types of Error Control Code, Code Rate and Redundancy, Coding Gain, Linear Block Codes and Coding Strength. Cyclic Codes, Hamming Codes, BCH Codes, Reed Solomon Codes.
Error Detection with an (m-k) Stages Shift Register.

EXAM #2 (75 Min.)

Chapter 6 (Text #2) + handouts
Section: 7.1 – 7.5

3.0 TOPICS: Channel Coding Part 2
Convolutional Codes: Encoding, Structural and Distance Properties. Maximum Likelihood Decoding of Convolutional Codes: The Viterbi Algorithm. Performance Bounds, Construction and Implementation of the Viterbi Algorithm.

Chapters 8 and 9 (Text #2)
Sections: 8.1-8.4 and 9.1- 9.6 plus handout

2.5 TOPICS: Channel Coding Part 3

Structural and distance properties, Interleaving and concatenated codes. Reed-Solomon Codes. Turbo Codes. Modulation and Coding Trade-offs. Shannon-Hartely Capacity Theorem. Bandwidth Efficiency Plane. Defining, Designing and evaluating Digital Communication Systems.

FINAL EXAM (110 Min.)

GRADING POLICY

1) Grades will be assigned based on class curve.
2) A performance around the average class performance will gain a B ;a performance superior to the class mean will gain an A- ; a performance very superior to the class mean will gain an A. A performance inferior to the class mean will gain a C and a very inferior will gain a D or an F.

Two Mid-Term Exams	50%
Final Exam	38%
Homework (incl. computer work)	12%

- EXAMS CANNOT BE MISSED.
- EVERY THURSDAY HOMEWORK WILL BE ASSIGNED AND WILL BE DUE NEXT THURSDA.
- HOMWORK MUST BE TURNED IN ON TIME AND CLEAN FORMAT TO RECEIVE CREDIT.
- CLASS ATTENDACE IS MANDATORY.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
6. Ability to communicate effectively by using written, oral, and electronic methods

Academic Dishonesty:

Academic dishonesty is not tolerated and will result in at least a course grade penalty. Incidents of dishonesty will also be reported to the office of Judicial Affairs. It is each student's responsibility to avoid academic dishonesty and to know the related university's policy.

EE 504A Linear Network Synthesis

Instructor: Maqsood A. Chaudhry
e-mail: chaudhry@fullerton.edu
Office: E-315
Office Phone: (714) 278-3901 or (714) 278-3013 (Secretary)
Office Hours: MW 12:00-1:00 PM and 4:00-5:00 PM or by appointment

Text:. Passive and Active Circuits, Theory and Implementations by W. K. Chen, 1986, Wiley.

Reference:
1. Analog and Digital Filters, Design and realization by H. Y-F. Lam, 1979, Prentice Hall.
2. Analog Filter design by V. Valkenberg, 1982, HRW.
3. Principals of Active Network Synthesis and design by G. Daryanani, 1979, Wiley.
4. Microelectronic Circuits by Sedra and Smith, Fifth Edition, Saunders.

COURSE OUTLINE

Chapter 1. Fundamentals of Network Synthesis. (Sections 1.1, 1.2, 1.6 to 1.9)
Chapter 2. Filter Approximation and Frequency Transformation.
Chapter 3. Passive Filter Synthesis.
Chapter 5. Active Filter Synthesis.
Chapter 6. Sensitivity.
Additional Topics in Filter design.

Mid-Term# 1 (after chapter 2, tentatively)	20%
Mid-Term# 2 (after chapter 3, tentatively)	20%
Final (cumulative)	35%
Design Projects	15%
Homework	10%

Design projects: There will be approximately 2 projects, each to be completed by the due date (usually two weeks).
Homework Assignments: Homework assignments will be given periodically in lecture. These will be graded, and credit will be given for assignments that are completed and turned in. You may study together on the homework assignments, but each student musts work independently for solving the problems.
Midterm: The schedule for midterm will be announced in the class. If you are absent for a midterm exam, you will receive a zero unless you have a valid excuse. Please contact me before the exam. If you cannot reach me before the exam, it is still your responsibility to talk with me as soon as possible. The default for an excused missed exam is that the final will have increased weight.
Final Exam: The final will be comprehensive. A missed final will be dealt with according to University regulations on incompletes and withdrawals.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EG-EE 507: Detection Theory

Instructor: K. Hamidian; Office E 217; Telephone: (675) 278-2884/ 278-3013
E-mail: khamidian@fullerton.edu; Fax (657) 278-7162
Office Hours: MW 1600-1730 and TTH 2015-2045

Prerequisite: EG-EE 580 Analysis of Random Signals.

Catalog Description: Formulation of decision rules for the detection of signals in a noisy environment, optimum receivers. Estimation of parameters of detected signals. Estimation theory.

Text: Detection and Estimation Theory, by James L. Melsa and David L. Cohn, McGraw-Hill (1978)

References: 1) Detection of Signals in Noise, by Robert N. McDonough and Anthony D. Whalen. Second Edition, Academic Press, 1995.
2) Detection, Estimation and modulation Theory, by Van Tress, Wiley, 1968.
3) Signal Detection and Estimation, by Mourad Barakt, Artech House.

TENTATIVE COURSE OUTLINE

CHAPTER 1 (1 week)
TOPICS: Introduction. Similarities between detection and estimation. Examination of several physical situations.

CHAPTER 3 (4 weeks)
TOPICS: Binary Decision: Maximum likelihood decision criterion, Neyman-Peason criterion, Probability of error criterion, Bayes risk criterion and Min-Max criterion.

EXAM#1 (75 minutes)

CHAPTER 4 (4 weeks)
TOPICS: Multiple observations, General Gaussian problem, Matched filter.

EXAM#2 (75 minutes)

CHAPTER 5 (3 weeks)
TOPICS: Multiple decisions: Bayes risk, Probability of error and Gaussian case.

CHAPTER 8 (3 weeks)
TOPICS: Introduction to estimation theory, Estimation with Gaussian noise and properties of estimators.

FINAL EXAM (110 minutes)

Grading Policy

1) Grades will be assigned based on a class curve.
2) A performance around the average class performance will gain a **B ;** a performance superior to the class mean will gain an **A**_; a performance very superior to the class mean will gain an **A** . A performance inferior to the class mean will gain a **C** and a very inferior will gain a **D** or an **F**.

Two Mid-Term Exams	50%
Final Exam	40%
Homework (Including Computer Work)	10%

- **EXAMS CANNOT BE MISSED.**
- **HOMWORK MUST BE TURNED IN ON TIME AND CLEAN FORMAT TO RECEIVE CREDIT.**
- **CLASS ATTENDACE IS MANDATORY**.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
6. Ability to communicate effectively by using written, oral, and electronic methods

Academic Dishonesty:

Academic dishonesty is not tolerated and will result in at least a course grade penalty. Incidents of dishonesty will also be reported to the office of Judicial Affairs. It is each student's responsibility to avoid academic dishonesty and to know the related university's policy.

EGEE - 510: Photoelectronics and Optical Lightwave Systems

Course Object and Learning Goals:
See "Electrical Engineering Program Educational Objectives (PEOs) and Outcomes (POs) Addressed" below

Textbook: ***"Fundamentals of Photonics", 2nd Edition, 2007***
B.E.A. Saleh and M.C. Teich, Wiley Interscience,
ISBN 978-0-471-35832-9

"Optoelectronics and Photonics – Principles and Practices", 2001
By S.O. Kasap, Prentice Hall Inc., ISBN 0-201-61087-6

References: 1."Electro-Optical: Device and Systems",
Mohammad A. Karim, PWS-KENT Publishing
2. "Elements of Modern Optical Design"
O'shea, Wiley Series in Pure and Applied Optics

Instructor: Dr. David Cheng
Office: E-318
Telephone: 657-278-3734
E-mail: dcheng@fullerton.edu

Office Hours:
Tuesday and Thursday: 5:30 p.m. - 7:30 p.m.
Wednesday: will be announced ahead of time.
Appointment: Can be arranged

Course Outline:

Text: "Fundamentals of Photonics", 2nd Edition, 2007

- **Quantum Electronics and Lasers**

  Chapter 12 Photon Optics
  Chapter 13 Photon and Atoms
  Chapter 14 Laser Amplifier
  Chapter 15 Lasers

- **Optoelectronics, Lightwave Devices and Lightwave System**

  Chapter 16 Semiconductor Optics, Section 16.1 & 16.2*
  Chapter 17 Semiconductor Photon Sources 17.2 and 17.3*
  Chapter 18 Semiconductor Photon Detectors*
  Chapter 19 Acousto-Optics Devices
  Chapter 20 Electro-Optics
  Chapter 23 Photonic Switching and Computing, Sections 2.1 to 2.3
  Chapter 24 Fiber Optics Communication

Text: "Optoelectronics and Photonics – Principles and Practices",

Chapter 3 Semiconductor Science and Light Emitting Diode*
Chapter 4 Stimulated Emission Devices Lasers*

Chapter 5	Photodetectors*
Chapter 6	Photovoltaic Devices
Chapter 7	Modulation of Light: Acoustic-Optic Modulator and Magneto-Optic Effects

will combine the materials from two textbooks

Time allowed: Laboratory Demonstrations and Laboratory Projects such as,

1. Leaser applications – Thin film thickness measurement using He-Ne laser
2. Fiber properties – Fiber attenuation measurement using GaAs laser

Examinations and Make-up Exam:

The dates for two midterms have been scheduled and will be announced again in the class. Make-up exam will be given only for legitimate reasons. The final exam will be comprehensive. A missed final will be deal with according to the university regulations. More detailed information will be discussed in the first meeting.

Homework:

Homework assignment will be announced in class in advance what problems will be collected. Detailed solutions to assigned homework problems will be posted or handed out, soon after homework problems are collected for grading. Homework must be turned in ***on time, and in clean, neat format*** to receive credit

Grading Policy:

Plus/Minus Grading policy will be applied. For their corresponding GPA values please see the UPS 300.020 (Attached with this syllabus)

Homework and projects	15 %	
Two Midterm Exams		50 %
Final Practicum		35 %
		100 %

Course Grade:

A	85 - 100 %
B	75 - 84 %
C	60 - 74 %
D	45 - 59 %
F	below 45%

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
3. Ability to integrate into the local and global workforce
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
6. Ability to communicate effectively by using written, oral, and electronic methods

Students' Right to Accommodations (see UPS 300-004, Item #7):
Information about students' right to accommodations for documented special needs via the Disabled Student Service Office. UH 101, (714)278-3117 or as documented at www.fullerton.edu/disabledservices/;

Information about CSUF Policies on Academic Integrity (see UPS 300.021):

Students who violate university standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the university. Since dishonesty in any form harms the individual, or other students, and the university, polices on academic integrity are strictly enforced.

Emergency Procedures Notice to Students

The safety of all students attending California State University Fullerton is of paramount importance. During an emergency it is necessary for students to have a basic understanding of their personnel responsibilities and the University's emergency response procedures. In the event of an emergency please adhere to the following guidelines

EG-EE 518 Digital Signal Processing (3)

Instructor: Dr. M. Shiva Telephone 278-3023
E-mail mshiva@fullerton.edu

Prerequisites: EG-EE 420

Text: 1. Digital Signal Processing, Oppenheim & Schafer, Prentice Hall.
2. Discrete-Time Signal Processing, 3/E, Oppenheim & Schafer, Pearson, 2010.

References: The Theory and Application of Digital Signal Processing,
Rabiner and Gold, Prentice Hall.

Week	Subject	Text Pages & Homeworks
1	Review of Discrete Fourier Transform (DFT) Representation of periodic sequences DFT and its properties Linear convolution, using circular convolution	
2	Computation of the DFT Goertzel algorithm Radix 2 Fast Fourier Transform (FFT)	
3	Decimation-in-Time FFT Algorithm Computation of radix 2 FFT, Basic butterfly for FFT Bit reversal and the reason for it Notational conventions for FFT	H.W. 1
4	Decimation-in-Frequency FFT Algorithm Computing an Inverse DFT by doing a Direct DFT	
5	FFT for a composite number Alternative forms of FFT	
6	Chirp Z-Transform Algorithm (CZT) CZT contour in Z and S planes Practical examples of FFT and CZT Comparing CZT to standard FFT	H.W. 2
7	Recursive computation of CZT Discrete-Time Random Signals Random Processes Probability functions	
8	Discrete-Time Random Signals, continued Expected Value, Mean-Square Value, Variance, Autocorrelation Sequence, Autocovariance Sequence Stationary Process, Ergodic Process	H.W. 3
9	Power Spectrum	

Response of a linear system to random signals
Floating-Point Numbers
Typical word set-up in a computer
----- Midterm -----

10 Floating-Point Arithmetic H.W. 4
Errors, Quantization effects
Representation of negative numbers

11 Finite register length effects
Limit Cycle
Statistical Analysis

12 Power Spectrum Estimation
Bias and variance of estimators
Consistency
Estimates of autocovariance

13 Power Spectrum
Bartlett's procedure
Indirect method (Windowing)

14 Modern Spectrum Analysis
Linear prediction-error filter

COURSE GRADE:	Midterm	30%
	Project	30%
	Final	40%

PROJECT: Studying some theoretical aspects and/or applications of FFT, or Spectral Estimation, or Digital Signal Processing, and presenting the results in the class. The presentation may take 15-20 minutes.

Course Grade will be assigned on curve

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
6. Ability to communicate effectively by using written, oral, and electronic methods

Make up exam: There are no make up exams.

Academic Integrity: Students who violate the university standards of academic integrity will be subject to disciplinary actions. Please see UPS 300.021 on school's web-site.

Disabilities: Students with disabilities are entitled to accommodations for documented special needs. Information about students' right to such accommodations can be obtained via the Disabled Student Service Office, UH 101, (714) 278-3117 or at www.fullerton.edu/disabledservices/ .

Emergency Information: Visit Campus Emergency Preparedness at http://www.fullerton.edu/Emergencypreparedness/ep_students.html

EE-519A Parallel and Multiprocessing (3)

Prerequisite	EE-412	
No. of midterms	2	
Weighting		Mt1-25% Mt2-25% No make up for midterms HW-20%(Term paper, on one aspect of Hypercubes and Parallel Processing) Final 30% (Comprehensive)

Text: Computer Architecture and Parallel Processing, by Kai Hwang and Faye Briggs.

Ref. books:

1-Computer Architecture and Organization, by J.P. Hayes

2-Advanced Computer Architecture, Parallelism, Scalability, Programmability, by Kai Hwang

3-Parallel Algorithms and Architectures: Array, Trees, Hypercubes, by F. Leighton

4-Parallel Processing in Information systems, by J. Zandt

5-Computer Architecture, a quantitative approach, by J.L. Henessy and D.A. Patterson

Course Description:

Parallel and Multiprocessing systems including hypercubes; shared distributive memory architectures, array and pipeline processors, communication protocols, routing algorithms and hands-on parallel programming experience on CSUF Hypercube System.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EE-519B Computer Networks and the Internet (3)

Prerequisite	EE-412
No. of midterms	2
Weighting	Mt1-25%
	Mt2-25%
	No make up for midterms
	HW-20%(Term paper, on one aspect of nterconnection networks)
	Final 30% (Comprehensive)

Text: Lecture Notes

Ref. books:

1-Advance Computer Architecture, Parallelism, Scalability, Programmability, by Kai Hwang, 1993

2-Parallel Algorithms and Architectures: Array, Trees, Hypercubes, by F. Leighton, 1992

3-Parallel Processing in Information Systems, by J. Zandt

4-Computer Architecture a quantitative approach, by J.L. Hennessy and D. A. Patterson

Course Description:

Computer networking with LAN, WAN to the Internet including ATM, Ethernet, Wireless and Blue Tooth technology, design of communication protocols, transmission media, security and control.

We will also discuss: SIMD, MIMD, loosely coupled and tightly coupled multiprocessors. Advance topics in computer architecture design to increase computing through-put and efficiency through, multiprocessing, distributed processing, array and pipeline processors. Advanced LAN security.

List of topics:

1. Computer Networks And The Internet.
2. Protocols and the TCP/IP Protocol Suite.
3. Traditional Applications.
4. Modern Applications.
5. Congestion and Performance Issues.
6. Transport Protocols.
7. TCP Traffic Control.
8. The Internet Protocol.
9. Integrated and Differentiated Services.
10. Protocols for QoS Support.
11. Interior Routing Protocols.
12. Exterior Routing Protocols and Multicast.
13. Communication Networks.
14. Data Link Control.
15. Network Security.
16. Network Management.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science

2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EE523A VLSI and Nano Technology and Devices

Instructor: Young D. Kwon
Office: Room E-417
Telephone: 278-3960

Text: "VLSI and Nano Device, Physics and Technology", Young D. Kwon , 2010

Reference: Current articles(Hand Outs)
The Science and Engineering of Microelectronic Fabrication 2nd Edition
Stephen A. Campbell
Oxford University Press 2001

Office Hour: Mon 2:00-400 PM

Weeks	Chapter	Topics
1	1	Classification of solids, Crystal Structure, Miller Indices, Defects, Vacancies, Dislocations, Impurities,
2 -2.5	1	Crystal Growing and Wafer Preparation; Czockralsky and Float-zone Method, Impurity Segregation, Zone Refining, Epitaxy; Basic System, Stacking Fault, Molecular Beam Epitaxy.
3-4	2	Energy Band Theory, Carrier Density, Generation and Recombination,
5-6	3	PN Junction Physics; Junction under Reverse Bias, Space Charge Layer, Built-in Field vs Reverse Bias, Reverse Saturation Current and Breakdown,
		Mid-Term #1
7-8	4	Oxide and Oxidation; Oxide Structure, Network-former and Modifier, Thermal Oxidation, Temperature and Ambient Effect on Oxidation, CVD and TEOS Oxide Oxide-Silicon Interface Physics; Interface Polarization, Oxide Charge, Interface States, High-k Dielectrics
9-10	5	Diffusion: Basic Process, Diffusion Equation, Diffusion System Multi-step Diffusion and Junction formation, Anomalous Diffusion, Defect generation, Secondary Effect, Evaluation of Diffused Layer, Junction Delineation, Sheet Resistance Measurement, Impurity Distribution Profiling,
10	6	Implantation System, Ion Implantation, Channeling, Annealing, Transient Enhanced Diffusion, Rapid Thermal Processing.

		Mid-Term #2
12	7	Metalization; Ohmic Contact and Choice of Metals, Vacuum Evaporator, E-Beam System, Sputtering System, Thin-film Reliability, Multi-Layer Metalization Cu-Damascene Process.
13	8	Screened Coulomb Field and Impurity-Impurity Interaction, Internal Pressure, Anomalous Diffusion and Defect Generation, Optically Enhanced Solubility.
14	9	Electronics of Carbon Nano-Tubes and Graphene, Si nano-crydtal and Quatum dot, Quatum-Well, Lumincense
		Final Exam

Grading Policy: Home Work and other Assignment 25%
Exams 75%

A: Top 20%
B. Next 30%
C+. Next 20%
C Next 20%

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
3. Ability to integrate into the local and global workforce
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EE523B CMOS VLSI Circuit Design

Instructor: Young D. Kwon
Office: Room E-417
Telephone: 657-278-3960

Prerequisite: EGEE 465 Introduction to VLSI design

Text: CMOS VLSI Design, Neil Weste and David Harris
Addison Wesley, 2009 4th Edition

References: Analysis and Design of Digital Systems with VHDL, Allen M Dewey
PWA Publishing, 1999
CMOS Digital Integrated Circuit, Sungmo Kang
McGraw Hill, 1995

Weeks	Chapter	Topics
1	1	Evolution of technology; PMOS, NMOS, CMOS, Nano-Devices and new frontier; Nano tube and graphene devices.
2-3	2	Review: MOS transistor theory; MOS surface physics; Oxide charge, Flat band, Strong inversion and threshold voltage. MOS Parasitic Capacitance, Body Effect, Drain Current Characteristics. Scaling.
4	3	CMOS fabrication process; Oxidation, Diffusion, Ion-implantation, Photolithography, Metalizaton. N-well vs P-well process, SOI structure,
4-5	1, 9	CMOS Logic Circuits; Inverter, NAND, NOR, Transmission Gate, Compound Gate, Tri-state, Multiplexer, Flip-Flops Layout editor Microwind and simulation, Layout rules, Stick diagram, Standard cell method, Pseudo NMOS, SOI circuits.
		Midterm #1
6 -7	Appx. A	Designing with VHDL and Verilog, hardware language
8-9	4, 8	Circuit characterization and Performance estimation ; Delay Estimation, R.C. Delay Model, Linear Delay Model, Delay in multistage logic, SPICE Simulation,
9-10	9	Dynamic circuit, Ratioed and ratioless, Advantage of dynamic circuit. Domino logic and other CMOS dynamic circuits. Latch and flipflops, Dynamic and static shift-register, Static and dynamic memory cell, I/O pad design
11-12	Handout	Advances topic: Short channel effect, Hot-carrier effect. LDD structure, Sub-threshold conduction and Halo diffusion, Leakage and Tunnel Current, Power dissipation, High-k dielectric, Electro-migration and Cu metallization, Mobility enhancement.

Midterm #2

13-14	12	ROMs, NAND and NOR ROMS, Programmable logic array (PLA). Field programmable logic array (FPGA), Flash memory.
15-16*		Handout CMOS Reliability Problems, Oxide charge, Q_{SS} and fast state, N_{FS}, NBTI(Negative bias threshold voltage instability) of PMOS.
		Physic and chemistry of graphene system

Final

*__Note__: Chapter 1-3 will be skipped if the majority of students took prerequisite, EE465. This will allow time for the added material listed in 15-16 week above.

Grading Policy : Home Work: 10%
Project: 20%
2 Mid terms: 40%
Final 30%

Electrical Engineering Student Learning Outcomes Addressed:

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EGEE 526 DIGITAL CONTROL SYSTEMS (3)

Instructor: Hassan H. Hashemi, Ph.D.
E216, Telephone: (657) 278-3402
hhashemi@fullerton.edu

Office Hours: 14:30 - 16:00 TR

Prerequisites: EGEE 416

Text: Digital Control System Analysis and Design, Charles L. Phillips & H. Troy Nagle, 3rd Edition, Prentice Hall, 1995

Reference:
1. Digital Control Engineering, M. Sami Fadali & A. Visioli, Academic Press, 2009
2. Digital Design, Principles & Practices, John F. Wakerly, 4th Edition, Pearson Prentice Hall, 2006.
3. Digital Control Systems, Benjamin C. Kuo, 2nd Edition, Saunders HBJ, 1992

Objective & Goals: To learn basic tools for analysis and design of digital control systems

COURSE OUTLINE

	No. of Weeks
1. Chapter 3: Sampling and Reconstruction HMWK 1: Chapter 3: 4 a & d, 5 a & b, 11, and 16.	1.5
2. Chapter 2: Discrete-Time Systems and the z-Transform HMWK 2: Chapter 2: 1, 2, 7, 9, 13, and 15.	1.5
3. Chapter 4 & 5: Open and Closed Loop Discrete-Time Systems HMWK 3: Chapter 4: 5, 9, 10, 19, and 21; Chapter 5: 1, 6, and 12.	1.5
4. Chapter 2: Discrete-Time Systems and the z-Transform (State Space Representation of Discrete-Time Systems) HMWK 4: Chapter 2: 22, 25, 28, and 29.	1.5
5. Chapter 7: Stability Analysis Techniques (Closed Loop Techniques) HMWK 5: Chapter 7: 4, 5, 7, 12 and 13.	1.5
Midterm Exam **(The exact date shall be announced)**	
6. Chapter 6: System Time-Response Characteristics HMWK 6: Chapter 6: 1, 2, 7, and 12.	1.5
7. Chapter 7: Stability Analysis Techniques (Open Loop Techniques) HMWK 7: Chapter 7: 14, 19, 22, and 24.	1.5
8. Chapter 8: Digital Controller Design HMWK 8: Chapter 8: 1, 2, 4, and 10.	1.5
9. Chapter 9: Pole Assignment Design and State Estimation	1.5

10. Chapter 15: Case Studies (Implementation of Digital Controllers) 1.5

Course Grade:

- Midterm Exams 30%
- Final Exam 60%
- HMWK 10% (Due Date: 1 week after the completion of the related materials)

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

Course Policy:

- Selected problems, either one or two, will be graded from each homework and points will be given for completeness of assignment. Each assignment will count 10 points, 5 points awarded for the graded problems and 5 points awarded for completeness.
- At the end of the semester, the percentage grades shall be curved and accordingly letter grades shall be assigned with +/- grading.
- No late or emailed HMWK under any conditions.
- No make-up exams under any conditions.
- Class attendance is mandatory and more than 3 absents shall lower the final letter grade by one level.
- Academic dishonesty shall have detrimental effects on your academic records.
- The University requires students with disabilities to register with the Office of Disabled Student Services (DSS), located in UH-101 (657 - 278 - 3112) in order to receive prescribed accommodations appropriate to their disability. Students requesting accommodations should inform the instructor during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes/tests/examinations.
- To be informed of the actions the students should take in case of emergency, please visit http://www.fullerton.edu/emergencypreparedness/ep_students.html.

EE-527 Fault Diagnosis and Fault-Tolerance Design (3)

Prerequisite	EE-448
No. of midterms	2
Timing of midterms	
Weighting	Mt1-25% Mt2-25% No make up for midterms HW-20%(Term paper, on one aspect of testing) Final 30% (Comprehensive)

Text book: Diagnosis and Reliable Design of Digital Systems, M.A. Breuer, and A.D. Friedman, Computer Science Press.

References:
1- Fault Detection in Digital Circuits, A.D. Friedman, and P.R. Menon, Prentice Hall

2- Fault-Tolerant Computing, Theory and Techniques, D.K. Pradhan, editor, Prentice Hall.

3- International Symposium on Fault-tolerant Computing, IEEE Publication.

Goals: Generation of test package and reliable design of a digital circuit Topics:

1- Review
1.1- Review of Combinational and Sequential Circuits
1.2-Introduction to fault detection and location, physical failures in ICs, and fault models.

2-Testing of Combinational Circuits(SSI,MSI)
2.1-Boolean Difference Method

2.2-Path Sensitization Method
2.3-Critical Path Method

3-Testing of Combinational Circuits
3.1-D Algorithm
3.2-Fault Collapsing and Equivalence

4-Testing of Sequential Circuits
4.1-Synchronous Circuits
4.2-Synchronizing Sequence
4.3-Asynchronous Circuits

5-Functional Testing
5.1-Checking Sequences
5.2-Transition Count Testing

6-Testing of Memories
6.1-Nature of faults in RAM
6.2-Test Package for RAM memories(Walking 0,1, Ping Pong, etc.)
6.3-Built-in-self-test
6.4-Boundary scan testing

7-Reliable Design

7.1-Error detection and correction codes, i.e., Hamming Codes
7.2-Self testing and self-checking concept
7.3-Fail safe design

8-Fault-Tolerant Design
8.1-Redundancy, TMR, NMR
8.2-Markov's Model

9-Design of Easily Testable Circuits
9.1-Placement of observe, and control points

10-System Level Diagnosis of Multiprocessors
10.1-Repair strategy in different architectures
10.2-One-step repair
10.3-Sequential repair
10.4-Repair of Hypercubes

11-Fault Simulation
11.1-Structure of fault a simulator
11.2-Delays
11.3-Levelizing
11.4-Parallel fault simulation
11.5-Deductive fault simulation
11.6-Concurrent fault simulation

12-Study of STAR (Self-Test And Repair) for Computers

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EGEE 531 Phase-locked and Frequency Feedback System (3)

Signals and Spectra. Baseband modulation and demodulation. Bandpass modulation and demodulation/detection. Theory of noise and linear system. FM feedback principles. Theory and design of phase-locked loops and their applications in communication and control.

Prerequisites: EGEE 580 or consent of instructor.

INSTRUCTOR: K. HAMIDIAN

OFFICE: E-217

TELEPHONE: 657-278-2884

PREREQUISITE TOPICS: Probability and Random Processes, Fourier Transform Applications, Linear Systems.

TEXTBOOK: 1) Digital Communications, Fundamentals and Applications
Bernard Sklar, Prentice Hall, 2000, 2nd Edition

2)Phase-Locked and Frequency Feedback Systems
J. Klapper and J. T. Frankle, Academic Press, 1972.

REFERENCES: 1) Phase Locked Loops and their Applications, W.C. Lindsey and M. K. Simon; eds; IEEE Press,
New York,1977.

2)Phase- Locked Loops, A. Blanchard ,John Willy & Sons, Inc; New York, 1976.

COURSE OUTLINE

WEEKS	TOPICS
2.0	Chapter 1. (Text#1) Introduction, Classification of Signals. Application of Fourier Transforms, Properties and Applications of Power and Energy Spectral Density. Representation of Narrow Band Signals and noise. Transmission of Signals Through Linear Systems. Random Processes . Stationary Processes. Ergodic Processes. Transmission of a Random Process Through a Linear-Time-Invariant Filter. Power Spectral Density. Gaussian Process Noise, Quadrature Representation of Narrowband Noise.
2.0	Chapters 2 (Text #1). Baseband System. Formatting Analog Information. Sampling and Quantizing Effect. Pulse Code Modulation. Baseband Modulation. Correlative coding.
2.0	Chapter 3 (Text#1) Baseband Demodulation/Detection. Signals and Noise. Detection of Binary Signals in Gaussian Noise. Intersymbol Interference. Equalization.

MIDTERM 1 (75 MINUTES)

5.5 Chapter 4(Text#1) Bandpass Modulation and Demodulation Phase Shift Keying, Frequency Shift Keying, Amplitude Shift Keying. Detection of signals in Gaussian Noise. Coherent Detection. Noncoherent Detection. M-ary Signaling and Performance. Symbol Error Performance for M-ary Systems.

Chapter 3 (Text#2) Loop Components and System considerations. Limiter- Discriminator. Voltage-Controlled Oscillator. Phase Detectors.

Chapter 5 (Text#2) Phase-Locked Loop Principles.Linear Operation. Nonlinear Operation. Excess Delay and Minimum Noise Bandwidth.

MIDTERM 2 (75 MINUTES)

4.5

(Text#2) Design of Phase-Locked Loops for FM Demodulation. Distortion-Limited Region. Threshold Limited Region. Step-by-Step Design Procedure and Examples.

Chapter 10 (Text# 1) Synchronization. Introduction. Receiver Synchronization. Frequency and Phase Synchronization. Symbol Synchronization. Frame Synchronization . Network Synchronization.

Final Exam (110 Minutes)

Grading Policy

1) Grades will be assigned based on a class curve.
2) A performance around the average class performance will gain a **B**; a performance superior to the class mean will gain a grade between a B+ and an **A+**. A performance inferior to the class mean will gain a grade between a B- and C and a very inferior will gain a **D** or an **F**.

Two Mid-Term Exams	53%	
Final Exam		35%
Homework (Including Computer Work)	12%	

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EGEE 537 Satellite Communications (3)

INSTRUCTOR: K. Hamidian, Office E-217, Telephone (567) 278-2884
E-mail: khamidian@fullerton.edu, Fax (567) 278-7162
Office Hours: MW 1600-1730, TTH 2015-2045

COURSE DESCRIPTION: Prerequisite: EGEE 443. Satellite Systems, Link Analysis, Propagation Effect, SNR/CNR Calculations, Modulation Schemes, FDMA, TDMA, CDMA Techniques.

TEXT: 1) *Satellite Communications* by T. Pratt, C. Bostian and J. Allnutt, John Wiley & Sons, 2003,Second Edition.

2) Digital Communications by B. Sklar, Second Edition, Prentice Hall, 2001.

REFERENCE:

1) Satellite Communications, edited by M. J. Miller, B. Vucetic and L. Berry Kluwer, Academic Publishers, 1993.

2) Elements of Digital Satellite Communications, Volume I, by W. W. Wu, Computer Science Press, Inc., 1984.

Tentative Course Outline

Text#1, Chapter 1, Sections (1.1- 1.5) + handouts

Topics: Introduction. The Origin of Satellite Communications. The Current State of Satellite Communications. Basic Concepts of Satellite Communications, Orbital and Spacecraft Problems, Growth of Satellite Communications.

Text#1, Chapter 4, Sections (4.1 -4.9) + handouts or
Text#2, Chapter 5, Sections (5.1-5.5) + handouts

Topics: Noise. The Basic RF Link, Three Special Types of Limits on Link Performance. Satellite Links: Up and Down Links, Intersatellite Links. Noise Temperature and Antenna Temperature. Propagation Factors. Rain Attenuation Model. System Design Examples.

Text#1, Chapter + handouts or
Text#2, Chapter 5, Sections 5.6-5.8 + handouts

Topics: Satellite Transponders, Function of Transponders, Transponder Implementation, Transmission Impairments and other Aspects of Transponders.

EXAM #1 (75 Minutes)

Text#1,Chapter 5, Sections (5.1 -5.6). Appendix B + handouts or
Text# 2, Chapter 4, Sections 4.1-4.9 + handouts

Topics: Modulation and Multiplexing Source Signals: Voice, Data and Video. Analog Transmission Systems. Digital Transmission Systems. Television Transmission.

EXAM #2 (75 Minutes)

Text#1, Chapter6, Sections (6.1 - 6.8) + handouts or
Text#2, Chapter 11, Sections (11.1-11.4) + handouts

Multiple Access : Definitions, FDMA Systems, TDMA Systems, Beam Switching and Satellite. Switched TDMA, CDMA Systems. Comparison of Multiple Access Techniques. ALOHA and S-ALOHA

Text#1, Chapter 9, Section (9.1 - 9.9) + handouts

Topics: VSAT Systems: Overview of VSAT system, Network Architectures, VSAT Earth Station. Transmitters and Receivers Antennas. Tracking Systems and System Design Procedure.

Final Exam (110 Minutes)

Grading Policy

1) Grades will be assigned based on a class curve.
2) A performance around the average class performance will gain a **B ;** a performance superior to the class mean will gain an **A**_; a performance very superior to the class mean will gain an **A** . A performance inferior to the class mean will gain a **C** and a very inferior will gain a **D** or an **F**.

Two Mid-Term Exams	50%
Final Exam	40%
Homework (Including Computer Work)	10%

- **. EXAMS CANNOT BE MISSED.**
- **. HOMWORK MUST BE TURNED IN ON TIME AND CLEAN FORMAT TO RECEIVE CREDIT.**
- **. CLASS ATTENDACE IS MANDATORY**.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
3. Ability to integrate into the local and global workforce
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
6. Ability to communicate effectively by using written, oral, and electronic methods

Academic Dishonesty:

Academic dishonesty is not tolerated and will result in at least a course grade penalty. Incidents of dishonesty will also be reported to the office of Judicial Affairs. It is each student's responsibility to avoid academic dishonesty and to know the related university's policy.

EGEE 557 Microprogramming and Embedded Microprocessors

Instructor: Pradeep Nair, Ph.D.

Course Description and Objective:

This course deals with microprogramming and the design of embedded microprocessors. Starting from basic digital design concepts, students will learn about microarchitecture, microprogramming, and micro-control. Instruction set design and central processing unit (CPU) design will also be covered in this course.

Prerequisites: EGEE 412 (Digital Computer Architecture and Design II), and EGEE 448 (Digital Systems Design and VHDL)

Textbook (required):

Fundamentals of Digital Logic and Microcomputer Design, Fifth edition M. Rafiquzzaman; Wiley Interscience

(Reference):

1. Computer Architecture: A quantitative approach, Fourth edition
   Hennessy and Patterson, Morgan Kaufmann publishers
2. Introductory VHDL: From simulation to synthesis
   Sudhakar Yalamanchili; Prentice Hall
3. VHDL: Programming by example
   Douglas Perry; McGraw Hill

Planned Assignments:

There will be quizzes, homework/laboratory assignments during the semester. All homework/assignments are due at the beginning of class on the due date, unless stated otherwise.

Grading Policy:

Class participation/Quizzes/pop-quizzes……..5%
Homework/Lab Assignments……...20%
Project and presentation……....15%
Mid-term Exam……..30%
Final Exam…….30%

Letter Grade Assignment Policy:

The letter grade will be ascertained based on the accumulated score calculated in accordance with the grading policy mentioned above. The +/- grading system will be used. The letter grade assignment policy is as follows:

96% or more…….A+
92-95.99%.....A
88-91.99%.....A–

85-87.99 %.....B+
82-84.99%.....B
78-81.99%.....B–
75-77.99%.....C+
72-74.99%.....C
68-71.99%.....C–
65-67.99%.....D+
62-64.99%.....D
58-61.99%.....D–
Less than 58%.....F

Exams:

Exams will be closed-book, closed-notes unless specified otherwise. All exams are mandatory and there will be no make-up exams. If a student misses an exam due to a compelling reason, he/she should notify the instructor in advance and provide supporting documentation. In such cases, the percentage points of the missed exam will be pro-rated evenly into the remaining exams, **if any**.

Project:

The final project can be carried out in a team of two members. Prior to starting their project, students are expected to identify their team partners and then submit a project proposal for instructor approval. This should be done no later than two weeks after the completion of the midterm exam.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

Special Needs:

Students with disabilities/special needs should contact the Office of Disabled Student Services (DSS), located in UH-101. The contact telephone number of the Office of Disabled Student Services (DSS) is 657-278-3117. Also, students with disabilities/special needs should inform the instructor so that arrangements can be made to accommodate the special needs. More information can be obtained at http://www.fullerton.edu/disabledservices/. Confidentiality will be protected.

Emergency preparedness:

It is important for students to have a basic understanding of the emergency response procedures of the University. Please read the Campus Emergency Preparedness information available at http://www.fullerton.edu/emergencypreparedness/ep_students.html

Academic Integrity Statement:

Students are expected to maintain a high standard of academic integrity. Policies on academic integrity will be strictly enforced. Familiarize yourself with the academic dishonesty policy, which can be found in the current student handbook or on the web at http://www.fullerton.edu/senate/PDF/300/UPS300-021.pdf

Other course-related policies:

1. Any disruptive classroom behavior that can adversely affect the learning environment will be reported and dealt with seriously.
2. Academic dishonesty will not be tolerated. You are encouraged to discuss subject material with your classmates. However, your homework/lab reports etc. should be written individually.
3. Attendance is mandatory. If a student cannot attend a class for any compelling reason, she/he should notify the instructor and provide appropriate documentation.

Tentative Course Outline

Week	Textbook chapter	Topics
1	1, 2	Digital Systems Review
2	3, 4, 5	Digital Systems Review – cont'd
3	6	Microcomputer Architecture and Programming
4	6, 7	System Design Concepts, Instruction Set Design
5	7	Instruction Set Design ; CPU Design (ALU)
6	7	CPU Design (ALU)
7	7	CPU Design (Control Unit)
8	7	CPU Design: Control Unit ; **Midterm exam**
9		Microprogramming and Control Unit Design
10	8	Microprogramming and Control Unit Design – cont'd
11	9	Embedded Processors
12	9	Embedded Processors – cont'd
13	10	Memory and I/O
14	10	Presentation
15	11	Presentation
16		**Final exam**

EE 558A Intel Microprocessors & Applications

Course Goals: Extend the students' competence to:
1) Design systems of interconnect sensors, chips, displays and actuators
2) Design programs that use the input data and commands to generate control signals for the actuators and displays
3) Use the microprocessor instruction set

Prerequisite: EE 404 Introduction to Microprocessors
(EE 412 Computer Architecture and Design II desirable)

Text: "The Intel Microprocessors Architecture, Programming, and Interfacing", Ed 8, by Barry B. Brey, Prentice Hall, 2009

Grading Policies: Homework 10%; Examinations: Midterm Exam 35%, Final Exam 55%

Nominal percentage grade ranges: 0— *F* —20— *D* —40— *C* —60— *B* —80— *A* —100

Examination Policies:
1. All examinations are closed book except for instructor supplied summary sheet.
2. No make up exams will be given. For an excused absence, the final exam percentage grade will be used in lieu of a missed exam grade.
3. The primary purpose of a reviewed exam is to provide a comprehension assessment to help you focus studying more effectively; the secondary purpose is providing a grade.

Homework Policies:
1. Homework is due at the **beginning** of the class period on the due date . Place your homework on the instructor's desk **before** taking your seat.
2. Place all work to be graded in the space allocated.
3. No credit for homework after it has been reviewed in class and/or answers have been made available.

Homework Review Policies:
1. Place your initials on the **Homework Review Request Sheet** after your name and under each problem number you wish to see worked in class. Problems with a sufficient number of student's initials will be worked in class.
2. Problem solutions will be posted or handed out.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

Cheating Penalty: 1st offense: F in the Course and possibly a Letter in your File
2nd offense: Expulsion from School

"The University requires students with disabilities to register with the Office of Disabled Student Services (DSS), located in UH-101 and at(714) 278 – 3112, in order to receive prescribed accommodations appropriate to their disability. Students requesting accommodations should inform the instructor during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes/tests/examinations."

μProcessor / μComputer References

1. Antonakos, J. L., "The Pentium Microprocessor", Prentice Hall, 1997
2. Brey, B. B., "Microprocessors and Peripherals", Ed 2, Merrill Pub. Co., 1988
3. Brey, B. B., "The Intel Microprocessors", Ed 4, Prentice Hall 1997
4. Brum & Brum, "80386 A Programming and Design Handbook", E2, TAB Books Inc, 1989
5. Camp, Smay & Triska, "Microprocessor Systems Engineering", Matrix Pub., inc., 1979
6. Ciminiera & Valenzano, "Advanced Microprocessor Architectures", Addison-Wesley,1987
7. Clemments, A., "Microprocessor Systems Design,68000 HW, SW & IF", E3, PWS, 1997
8. Clemments, A., "68000 Family Assembly Language", PWS-Kent, 1994
9. D'Angelo, H., "Microcomputer Structures", BYTE Books/McGraw-Hill, 1981
10. Dewar & Smosna, "Microprocessors a Programmer's Vie", McGraw Hill, 1990
11. Getgen, L. E., "Designing with Microprocessors", SRA, 1985
12. Fulcher, J., "An Introduction to Microcomputer Systems, Architecture & Interfacing", Addison-Wesley, 1989
13. Gault & Pimmel, "Micro-Computer-Based Digital Systems", McGraw-Hill, 1982
14. Gibson & Liu, "Microcomputers for Engineers and Scientists", Prentice-Hall, 1987
15. Goody, R. W., "Microcomputer Fundamentals a laboratory approach", SRA, 1980
16. Ismail & Rooney, "Microprocessor Hardware and Software Concepts", Macmillan, 1987
17. Hall, D. V., "Microprocessors and Digital Systems", McGraw Joll, 1983
18. Harman & Hein, "The Motorola MC 68000 Microprocessor Family",E2, Prentice Hall,1996
19. Haskell, R. E., "Intro. to Computer Engineering Logic Design and the 8086 □processor", Prentice Hall, 1993
20. Karalis, E., "Digital Design Principles and Computer Architecture", Prentice Hall 1997
21. Krutz, R. L., "Interfacing Techniques in Digital Design ... Microprocessors", Wiley, 1999
22. Leventhal, L. A., "Introduction to Microprocessors: Softwre, Hardware, Programming", Prentice-Hall, 1978
23. Lipovski, G. P., "Single & Multiple-Chip Micromputer Interfacing", Motorola,Prentice Hall, 1988
24. Motorolla, "MC68000 Programmer's Reference Manual", E5, Prentice Hall, 1986
25. Rafiquzzaman, M., "Microprocessors, Theory & App., Intel & Motorola", Prentice Hall, 92
26. Rafiquzzaman, M., "Fundamentals of Digital Logic and Microcomputer Design", Rafi Systems, inc, 1998
27. Rooney & Ismail, "Microprocessors and Microcomputers", Macmillan, 1984
28. Seidensticker, R. B., "The Well-Tempered Digital Design", Addison Wesley, 1986
29. Short, K. L., "Microprocessors and Programmed Logic", E2, Prentice Hall, 1987
30. Singh & Triebel, "The 8088 Microprocessor", Prentice Hall, 1989
31. Tabak, D., "Advanced Microprocessors", E2, McGraw Hill, 1995
32. Taub, H., "Digital Circuits and Microprocessors", McGraw-Hill, 1982
33 Tribel, W. A., "The 80586, 80486 and Pentium Processor", Prentice Hall, 1998
34. Tribel & Singh, "The 8088 and 8086 Microprocessors", E3, Prentice Hall, 2000
35. Uffenbeck, J., "The 8086/8088 Family Design Prog. & Interfacing, Prentice Hall, 87
36. Uffenbeck, J., "The 80x86/ Family Design Prog. & Interfacing, E2, Prentice Hall, 98

Assembly Language Programming References

1. Grey, R. L., "Macro Assembler Programming for the IBM PC and Compatibles", Macmillan 1997
2. Scanlon, L. J.,."8086/8088/80286 Assembly Language", Simon & Schuster, inc., 88

EGEE 558B Microprocessor & System Applications

Instructor:	Dr. Jidong Huang	**Phone**:	657-278-7140
Office:	E - 211	**Email**:	jhuang@fullerton.edu
Class Location:	E - 321		
Class Time:	M, W: 7:00pm – 8:15pm		
Office Hours:	M, W: 1:00pm – 2:30pm Tu: 11:30am – 12:30pm (or by appointment)		

Prerequisite: EGEE 558A

Text: *The Motorola MC68000 Microprocessor Family: Assembly Language, Interface Design, and System Design,* Thomas L. Harman & David T. Hein, 2nd edition, Prentice Hall, 1996

Course Objective: The goal of this course is to introduce the advanced microprocessor architecture and its system applications. Topics covered in this course include microprocessor architecture, RISC v.s. CISC, operating system support, microcomputer networking and data communications.

Course Grading:	Midterm 1	25%
	Midterm 2	25%
	Final Exam	30%
	Homework/Presentation/Project Report	20%

Homework: There will be multiple homework assignments, presentations/project for this course. The content as well as the schedule for these assignments will be announced as the course progresses.

Exams: Closed notes and book on all exams. The midterm tests will cover specific lecture topics. The final exam will be comprehensive. If you have any compelling reasons for not being able to attend the midterm test, prior authorization from the instructor at least 1 week ahead will be required. A make-up test may be provided. The final exam date is mandatory and required for successful completion of this course.

Letter Grades: Your final grade will be based on the total accumulated points. The following grading scale will be used,

A: 93-100%	A-: 90-92%	B+: 87-89%	B: 83-86%	B-: 80-82%
C+: 77-79%	C: 73-76%	C-: 70-72%	D+: 67-69%	D: 63-66%
D-: 60-62%	F: below 60%			

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

Policies: You are allowed to discuss course topics and project requirements with your classmates. However, the reports and homework assignments turned in shall be your individual work reflecting your own thoughts. Academic dishonesty and cheating in any form will not be tolerated. The penalty for any instance of academic dishonesty will be based on University Policy Statement (UPS) 300.021.
Special Needs: The University requires students with disabilities to register with the Office of Disabled Student Services (DSS), located in UH-101 and at (657) 278–3112, in order to receive prescribed accommodations appropriate to their disability. Students requesting accommodations

should inform the instructor during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes/tests/examinations.

Emergency Policy: Please refer to university emergency policy at
http://www.fullerton.edu/emergencypreparedness/ep_students.html

Tentative Course Outline

Topics:

Introduction;
Microcomputer and Microprocessor Characteristics;
Computer Arithmetic, Representation of Numbers and Characters;
Motorola M68000 Family;
Motorola M68000 Assembly Language Programming Techniques;
Microprocessor Interfacing and I/O Programming;
Microcomputer Memory Systems;
RISC v.s. CISC;
Operating Systems;
Data Communication Protocols;
Microcomputer Networking;
Microprocessor Based System Case Study: GPS Receiver.

Note: The above is a tentative schedule for the lecture topics.

EGEE 559 Introduction to Robotics

Instructor: Dr. Jidong Huang **Phone**: 657-278-7140
Office: E-211 **Email**: jhuang@fullerton.edu
Class Location: E-221
Class Time: M, W: 4:00pm – 5:15pm
Office Hours: M, W: 3:00pm – 4:00pm, and T: 2:30am – 3:30pm (or by appointment)

Prerequisite: EGEE 416
Recommended Text:

Robotics: Basic Analysis and Design, William A. Wolovich, Oxford University Press, 1986
Robotics: Modeling, Planning and Control, Siciliano, B., Sciavicco, L. Villani L, Orioio, G., Springer, 2009
Introduction to Robotics: Mechanics and Control, 2nd Edition, John J. Craig, Addison-Wesley Publishing, 1989
Introduction to AI Robotics, Robin R. Murphy, The MIT Press, 2000
Robotics: Control, Sensing, Vision and Intelligence, King-Sun Fu et al., McGraw-Hill Education, 1987

Course Objective: The goal of this course is to introduce the science of robotics from an electrical engineering standpoint, including modeling, task planning, control, sensing and robot intelligence.

Course Grading:	Homework/ Project Report	20%
	Midterm 1	25%
	Midterm 2	25%
	Final Exam	30%

Homework: There will be multiple homework assignments, case study or project for this course. The content as well as the schedule for these assignments will be announced as the course progresses.

Exams: Closed notes and book on all exams. The midterm test will cover specific lecture topics. The final exam will be comprehensive. If you have any compelling reasons for not being able to attend the midterm test, prior authorization from the instructor will be required. A make-up test may be provided. The final exam date is mandatory and required for successful completion of this course.

Letter Grades: Your final grade will be based on the total accumulated points. The following grading scale will be used,

A: 93-100%	A-: 90-92%	B+: 88-89%	B: 83-87%	B-: 80-82%
C+: 78-79%	C: 73-77%	C-: 70-72%	D+: 68-69%	D: 63-67%
D-: 60-62%	F: below 60%			

Policies: You are allowed to discuss course topics and project requirements with your classmate. However, the lab reports and homework assignments turned in shall be your individual work reflecting your own thoughts. Academic dishonesty and cheating in any form will not be tolerated. The penalty for any instance of academic dishonesty will be based on University Policy Statement (UPS) 300.021.

Special Needs: If you have any disability or special needs for which you may require accommodation, please notify the instructor immediately and contact the Disabled Services Office (University Hall 101) at 657-278-3117.

Emergency Policy: Please refer to university emergency policy at
http://www.fullerton.edu/emergencypreparedness/ep_students.html

Tentative Course Outline

Topics:

Introduction and Overview to Robotics
Introduction to Industrial Manipulators (Robotic Arms)
Forward and Inverse Kinematics
Trajectory Planning
Dynamics (Kinetics)
Mobile Robots
Positioning Control
Sensors and Sensing Systems
Navigation and Path Planning
Robotic Controllers, and Computer Programming for Robotics

Note: The above is a tentative schedule for the lecture topics.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EE 580 Analysis of Random Signals

Instructor: Dr. M. S. Grewal Telephone: 657-278-3874
Office Hours : TuTh 2:15-2:45, 4:30-5:30, MW 3:30-4:00 PM Secretary: 657-278-3013
e-mail: mgrewal@fullerton.edu

Prerequisites: EE 323, 409
Corequisites: EE 581
Text: *Kalman Filtering Theory & Practice Using MATLAB® 3rd Edition,* M. S. Grewal and A. P. Andrews, Wiley & Sons, **2008**
Reference: *Probability, Random Variables and Stochastic Processes*, A. Papoulis, McGraw Hill

COURSE OUTLINE

General Concepts, Review of Matrices (Appendix B)
- Matrix Forms
- Matrix Operations
- Block Matrix Formulas
- *Functions of Square Matrices*
- Norms
- Orthogonal Decompositions of Matrices
- Quadratic Forms
- Derivatives of Matrices

General Information
- On Estimation Methods, Least Square Methods
- Notation Used in the Text

Linear Dynamic Systems (Chapter 2)
- Dynamic Systems
- Continuous Linear Systems and Their Solutions
- Discrete Linear Systems and Their Solutions
- Observability of Linear Dynamic System Models
- Procedures for Computing Matrix Exponentials

Stochastic Processes (Chapter 3)
- Probability and Random Variables
- Statistical Properties of Random Variables
- Statistical Properties of Random Processes
- Linear System Models of Random Processes and Sequences
- Shaping Filters and State Augmentation
- Covariance Propagation Equations
- Van Loan Method with MATLAB®

Linear Optimal Filters (Chapters 3, 4)
- Orthogonality Principle
- Mean Square Estimators
- Kalman-Bucy Filter
- Optimal Linear Predictors
- Correlated Noise Sources

GRADE

Mid-Term No. 1	20%
Mid-Term No. 1	20%
Final	55%
Homework	5%

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EGEE 581: THEORY OF LINEAR SYSTEMS

Course Description:

State space analysis, linear dynamical equations and impulse-response matrices, controllability and observability of linear systems, state feedback and state estimators, stability of linear systems, time-varying and time-invariant cases, numerical methods of linear systems analysis and design.

Prerequisites: EGGN 403 and EGEE 416

Textbook: "Linear System Theory and Design," Chi-Tsong Chen, Oxford University Press, 3rd edition, 1999.

Instructor: Professor Fleur T. Tehrani

Office: E-317

Email: ftehrani@fullerton.edu

Tel: (657) 278-2658

Office Hours: MW: 4:00-5:30 pm
T: 4:00-5:00 pm

Tentative Course Outline

Week	Chapter	Topic
1,2,3	2	Mathematical descriptions of systems, the state-variable description, dynamical equations, computer simulations of linear dynamical equations, linearization, discrete- time systems.
4,5,6	4	Solutions of dynamical equations, equivalent dynamical equations, impulse-response matrices and dynamical equations, time varying and time-invariant cases.
6		Midterm Exam #1
7,8	5	Stability of linear systems, Routh-Hurwitz criterion stability of linear dynamical equations, time-varying and time-invariant cases, Lyapunov theorem, discrete-time systems. Numerical methods and computational problems.
9, 10	6	Controllability of linear dynamical equations, observability of linear dynamical equations, canonical decomposition of a linear time-invariant dynamical equation, controllability and observability of Jordan-Form dynamical equations. Controllability and observability of discrete-time systems. Numerical techniques and computational problems.

11,12	8	State feedback, state estimators, stabilization, functional estimators, decoupling by state feedback, single-variable and multivariable cases.
13		Midterm Exam #2
13,14	7	Minimal realization and coprime fractions, balanced realization, realizations from Markov parameters, minimal realizations-matrix case.
15		Review
16		Final Exam

Grading Policy

Homework	10%
Midterms	50%
Final	40%

Note: plus/minus grading will be used.

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
3. Ability to integrate into the local and global workforce
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

No Make Up Exams

Make-Up Policy: If a midterm exam is missed due to a legitimate reason and proper documentation is provided by the student, the weight of the missed exam will be proportionately divided between the other remaining tests. No make-up exam will be given. If no legitimate reason is provided for missing the test, zero score will be assigned to the missed exam.

Academic Integrity: Cheating or plagiarism is considered a gross violation of the University's academic standards and is subjected to discipline according to the State of California Code of Regulations.

Additional Note to Students with Disabilities: The University requires students with disabilities to register with the Office of Disabled Student Services (DSS), located in UH-101 and at (657) 278 – 3117, in order to receive prescribed accommodations appropriate to their disability. Students requesting accommodations should inform the instructor during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes/tests/examinations.

EG-EE 582 Linear Estimation Theory

Instructor: Prof. M. S. Grewal
e-mail: mgrewal@fullerton.edu
Telephone: (657) 278-3874
FAX: (657) 278-7162
Office Hours: M 4:30-5:30 PM, W 5:00-5:30 PM

Prerequisites: EG-EE 580, 581, MATLAB®
www.ecs.fullerton.edu/~mgrewal

Text: *Kalman Filtering Theory & Practice Using MATLAB, Third Edition*
Grewal & Andrews, Wiley & Sons, 2008

COURSE OUTLINE

Chapter 1: General Information (Review)

Chapter 2: Linear Dynamic Systems (Review)

Chapter 3: Random Processes & Stochastic Systems

(Review)

MID-TERM # 1

Chapter 4: Linear Optimal Filters and Predictors

Chapter 5: Non Linear Applications

Chapter 6: Implementation Methods

MID-TERM # 2 (Take Home Project)

Chapter 7: Practical Considerations

FINAL EXAM: See Schedule

GRADE

Midterms # 1, 2	40%
Final	55%
Homework	5%

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

EG-EE 585 OPTIMIZATION TECHNIQUES IN SYSTEMS ENGINEERING (3)

Instructor: Hassan H. Hashemi, Ph.D.
E216, Telephone: (654) 278-3402
hhashemi@fullerton.edu

Office Hours: 10:00 - 12:00 TR (Furlough Days: 2/16/2010, 3/4/2010, 3/9/2010, 4/22/2010, and 4/27/2010)

Prerequisites: EGN 403 or Math 340 for Computer Science Majors

Textbook: Lecture Notes.

Reference:
1. Dynamic Programming & Optimal Control, Vol. I & II, Dimitri P. Bertsekas, 3rd Edition, Athena Scientific, 2007.
2. Applied Calculus of Variations for Engineers, Louis Komzsik, CRC Press, 2008.
3. Lagrange Multiplier Approach to Variational Problems & Applications (Advances in Design & Control), Kazufumi Ito & Karl Kunisch, SIAM, 2008.
4. Structural Dynamic Systems Computational Techniques & Optimization (Engineering, Technology & Applied Science), Cornelius T. Leondes, Gordon & Breach Science Publishers, 1999.

Objective & Goals: ***To learn basic tools for analysis and design of optimization techniques in systems engineering.***

COURSE OUTLINE

	No. of Weeks
1. Introduction HMWK 1 - Handout.	1.5
2. Dynamic Programming HMWK 2 - Handout.	3.0
3. Calculus of Variations HMWK 3 - Handout.	3.0
(Midterm Exam)	0.5
4. Variational Approach to Optimal Control Problems HMWK 4 – Handout.	3.0
5. Numerical Determination of Optimal Trajectories HMWK 5 - Handout.	3.0
6. Conclusion HMWK 5 - Handout.	2.0

Course Grade:

- Midterm Exams 30%
- Final Exam 60%
- HMWK 10% (Due Date: 1 week after the completion of the related materials)

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints

Course Policy:

- Selected problems, either one or two, will be graded from each homework and points will be given for completeness of assignment. Each assignment will count 10 points, 5 points awarded for the graded problems and 5 points awarded for completeness.
- At the end of the semester, the percentage grades shall be curved and accordingly letter grades shall be assigned with +/- grading.
- No late or emailed HMWK under any conditions.
- No make-up exams under any conditions.
- Class attendance is mandatory and more than 3 absents shall lower the final letter grade by one level.
- Academic dishonesty may result in an F for the course grade.
- The University requires students with disabilities to register with the Office of Disabled Student Services (DSS), located in UH-101 (714 - 278 - 3112) in order to receive prescribed accommodations appropriate to their disability. Students requesting accommodations should inform the instructor during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes/tests/examinations.

EG-EE 587 OPERATIONAL ANALYSIS TECHNIQUES IN SYSTEMS ENGINEERING (3)

Instructor: Hassan H. Hashemi, Ph.D.
E216, Telephone: (657) 278-3402
hhashemi@fullerton.edu
Office Hours: 15:00 - 17:00 TR

Prerequisites: EGEE 323 or Math 338 for Computer Science majors

Textbook: Lecture Notes.

Reference:
1. Deterministic Operations Research: Models and Methods in Linear Optimization, David J. Rader, John Wiley & Sons, Inc., 2010.

2. Introduction to Operations Research, Frederick S. Hillier & Gerald J. Lieberman, McGraw-Hill, 2010.
3. Schaum's Outline of Operation Management, Joseph G. Monks, 2nd Edition, McGraw-Hill, 1996.
4. Check the following website for many more good books on this subject:
http://www.amazon.com/s/ref=nb_sb_noss?url=searchalias

Objective & Goals: To learn Operation Research Models & Methods in Systems Engineering.

COURSE OUTLINE

	No. of Weeks
1. Chapter 1:Introduction to Operation Research	0.5
2. Chapter 2: Linear Programming Models	
HMWK 1 - Handout	2.5
3. Chapter 3: Linear Programming Methods	
HMWK 2 - Handout	2.5
4. Chapter 4: Integer Programming Models & Methods	
HMWK 3 - Handout.	2.0
(Midterm Exam)	0.5
5. Chapter 5: Network Flow Models & Methods	
HMWK 4 – Handout.	2.0
6. Chapter 6: Models for Stochastic Processes	
HMWK 5 - Handout.	1.0
7. Chapter 7: Discrete- and Continuous-Time Markov Chain	
HMWK 6 - Handout.	2.0
8. Chapter 8: Monte Carlo Methods & Applications	
HMWK 7 - Handout.	2.0
(Final Exam: Comprehensive)	

Course Grade:

□ Midterm Exams	30%
□ Final Exam	60%
□ HMWK	10%

Course Policy:
□ Selected problems, either one or two, will be graded from each homework and points will be given for completeness of assignment. Each assignment will count 10 points, 5 points awarded for the graded problems and 5 points awarded for completeness.
□ At the end of the semester, the percentage grades shall be curved and accordingly letter

grades shall be assigned with +/- grading.
 No late or emailed HMWK under any conditions.
 No make-up exams under any conditions.
 Class attendance is mandatory and more than 3 absents shall lower the final letter grade by one level.
 Academic dishonesty shall have detrimental effects on your academic records.
 The University requires students with disabilities to register with the Office of Disabled Student Services (DSS), located in UH-101 (657 - 278 - 3112) in order to receive prescribed accommodations appropriate to their disability. Students requesting accommodations should inform the instructor during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes/tests/examinations.
 To be informed of the actions the students should take in case of emergency,

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints
5. Ability to assume leadership roles

EG-EE 588 ENGINEERING DESIGN OF SYSTEMS

Course Description: Complete and unified process for engineering a system including modeling techniques required for systems engineering. Topics include: definition of system; systems engineering process and lifecycle; basic concepts of system design and modeling using CORE; requirements analysis; functional, physical, and operational architecture development; interface design; system integration and testing; and decision analysis for design trades.

The objective of this class is to learn a set of methods for model-based design and optimization of complex systems. The student will demonstrate that this objective has been met by successfully completing a model-based design and analysis project. Projects will be conducted by teams appointed by the instructor.

Prerequisites: EGEE425

Textbook: ***The Engineering Design of Systems: Models and Methods, 2nd edition***, D. M. Buede, New York, NY: John Wiley & Sons, Inc.

Topics:

1. Introduction to Systems Engineering, Systems design process, CORE (2 weeks)
2. Modeling and process modeling, CORE functional diagrams: (2 weeks).
3. Requirements, defining the design problem, CORE data base: (2 weeks).
4. Functional architecture development, CORE functional model: (2 weeks)
5. Physical architecture development, CORE component model: (1 week)
6. Operational architecture development, CORE data base: (1 week)
7. Interface design, complete CORE data base (1 week)
8. Integration and qualification: (1 week).
9. Decision Analysis for Design Trades (1 week)
10. Knowledge Based Architecting (1 week).
11. Review and Written Final Exam (1 week)
12. Team project presentations and individual project reports (Final week)

Homework: assignment to be handed in every two weeks. Some will require computer use to complete.

Project: Team project presentations will be during the regularly scheduled final exam period. Each student will prepare an individual project report (5 page summary) to be handed in at the end of the final exam period. Half the project grade will be based on the team project presentation and the other half will be based on the individual project report.

Grading:

Final	200 points	A: 92-100%, B:80-91%, C:65-79%,
Homework	100 points	D: 50-64%, F:<<50%
Project	200 points	+/- grading will be used
Total	500 points	

Electrical Engineering Student Learning Outcomes Addressed:

1. Academic preparation and the proficiency in mathematics, and science
2. Ability to solve problems in modern engineering practice
4. Ability to identify, formulate, design, implement, and solve engineering problems that meet desired needs within realistic constraints