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CALIFORNIA STATE UNIVERSITY, LOS ANGELES

Electrical Engineering Undergraduate Student Handbook

Thirteenth Edition

Effective Fall Semester 2018

Revised on May 10th, 2018
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EE Student Handbook Thirteenth Edition

Prepared by the Faculty of the Department of Electrical and Computer Engineering,
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Although every attempt has been made to keep this handbook up to date and accurate, it is an advising tool and not an official University policy statement. Therefore, in cases where there are contradictions, the official university rules take precedence over statements in this handbook.

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CONTENTS

I.	INTRODUCTION	3
II.	MISSION AND EDUCATIONAL OBJECTIVES	4
III.	HOW AND WHEN TO SEE AN ADVISOR	5
IV.	HOW TO REGISTER	6
V.	POLICY ON DROPPING CLASSES	7
VI.	GENERAL EDUCATION PROGRAM	7
VII.	LOWER DIVISION REQUIREMENTS	8
VIII.	UPPER DIVISION REQUIREMENTS	9
IX.	ELECTIVES	10
X.	PREREQUISITES	12
XI.	MATH PLACEMENT CATEGORIES IN STEP	14
XII.	PROFESSIONAL ACTIVITIES	15
XIII.	APPLYING FOR GRADUATION	16
XIV.	ACADEMIC STANDARDS	16
XV.	FORMS	
	GE ADVISEMENT FORM	17
	GE FOR ENGINEERING MAJORS	18
XVI.	ROADMAPS	19
	FOUR YEAR ROADMAP	19
	TWO YEAR ROADMAP	21

I. INTRODUCTION

Welcome to the Department of Electrical and Computer Engineering at California State University, Los Angeles. The faculty members of the department are pleased to provide you with this information manual. You are expected to read this entire manual. Failure to become aware of the information presented may well delay your graduation! If you have any questions, make sure to ask an advisor.

If you have not already done so, you should review the latest University Catalog and Schedule of Classes for the current semester that are both available on-line. The schedule contains much more than the listing of classes being offered during the semester. It also contains important rules and regulations and critical dates and deadlines. The University Catalog can be found on the Cal State L.A. website at <http://ecatalog.calstatela.edu/>, while the schedule of classes is available at <http://www.calstatela.edu/ecst/ece/schedule>

The Website of the University Scheduling Office is at <http://www.calstatela.edu/registrar/university-scheduling-office>. It provides important information of each term including the Printable Master List of Classes, Schedule of Classes, Academic Calendar, and Final Exam Schedule. It is very helpful for you to find out such information in this Website.

Note: the schedule goes to production long before the semester begins, and changes occur while it is being processed. The most up-to-date version of the Electrical Engineering class schedule is posted on a bulletin board next to the department office and also available through GET at <https://get.calstatela.edu> (follow the links at this website)

Instruction in Electrical Engineering is offered Fall and Spring on a semester system with the possibility of Winter and Summer sessions. Each of the two semesters that comprise the academic year (Fall and Spring) is typically 16 weeks in duration - fifteen weeks for instruction and one week for final exams. You may accelerate your program by attending the Winter and Summer Sessions when available, although to maintain continuing student's status, you only need to attend two semesters within any 12 month period.

The BS degree program in Electrical Engineering is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). You will need a minimum of 122 semester units to obtain the degree. The 122 units are divided into General Education (GE) and the major as follows:

- 21 units of General Education
- 42 units of Lower Division Required courses in the major
- 42 units of Upper Division Required courses in the major
- 17 units of Electives in the major

The General Education (GE) courses comprise 21 of the 122 units. GE requirements are modified for engineers. Do not use the GE requirements in the Schedule of Classes. Instead, refer to the modified GE form at the end of this handbook. A faculty advisor will help you decide which courses you should select.

The Lower Division Required courses comprise 42 of the 122 units. These courses are in the areas of Physics, Chemistry, Calculus, and Basic Engineering. They are numbered 1xxx and 2xxx. If you need to take certain remedial math courses, these won't be counted toward the 42 units. Consult ECST Advising Center (<http://www.calstatela.edu/ecst/success/academic-advising>) for more details of the remedial courses.

The Upper Division Required courses comprise 42 of the 122 units. These are your basic junior- and senior-level Electrical Engineering courses; they are required of all EE majors. They are numbered 3xxx and 4xxx, although most of the required core is at the 3000 level.

The remaining 17 units are your Electives including 15 units in upper division elective lectures and 2 units in upper division elective labs. These courses are mostly at the 4000-level. These courses give you the chance to select a specialization area within Electrical and Computer Engineering. 3 lectures and 1 lab have to be taken in one area of specialization with an advisor's approval. You should consult with a faculty advisor to select your area(s) of specialization and receive advisement on which courses to take. He or she can discuss your career goals with you and give helpful suggestions.

While it is a good idea to continue to see the same advisor, you can approach any faculty member who is free at the time to discuss any problem you may have. You will find that the faculty have your best interests at heart. The more you become involved with the department, the more you will benefit. Section III describes how and when to see an advisor.

The Department of Electrical and Computer Engineering is here for you! Use it to your advantage.

II. MISSION AND PROGRAM EDUCATIONAL OBJECTIVES

This section describes the mission, educational objectives, and outcomes of our Electrical Engineering program.

Mission:

To be a pre-eminent Electrical Engineering program that accepts students from diverse backgrounds and through academic excellence prepares them for successful electrical engineering careers.

Program Educational Objectives:

The Educational Objectives of Electrical Engineering program at California State University, L.A. are broad statements that describe what graduates are expected to attain within a few years of graduation. The objectives of BSEE program are to prepare graduates who will be successful in their chosen career paths. Specifically, within a few years of graduation, Electrical Engineering graduates are expected to:

- 1) Establish themselves as professional engineers in industrial and governmental positions, or be engaged in advanced studies;
- 2) Apply the knowledge, skills, and attitudes attained at CSULA to devise engineering solutions which meet the needs of their community locally and globally while making efficient use of available resources;
- 3) Adhere to a high standard of ethics in their engineering profession.

The BSEE program adopted the ABET Criterion 3 a-k student outcomes to prepare students to attain the Program Educational Objectives. The a-k Student Outcomes are listed below:

- a. an ability to apply knowledge of mathematics, science and engineering
- b. an ability to design and conduct experiments, as well as to analyze and interpret data
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. an ability to function on multidisciplinary teams
- e. an ability to identify, formulate, and solve engineering problems
- f. an understanding of professional and ethical responsibility
- g. an ability to communicate effectively (3g1 orally, 3g2 written)
- 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.

III. HOW AND WHEN TO SEE AN ADVISOR

All full time faculty in the Department of Electrical and Computer Engineering serve as advisors although the department has two faculty in addition to the chair who act as the primary principal departmental advisers. Advising hours are posted outside the department and faculty offices. You may select your own advisor based on your area of specialization or schedule constraints. While you are encouraged to select a permanent advisor, you can meet with any faculty advisor.

When to see an advisor:

1. Prior to your first semester of attendance, there will be an orientation session you can attend where an advisor makes sure that you understand the rules.
2. You must then meet with an advisor during your first semester of attendance. During this session you should learn to use the Golden Eagle Territory (GET) system to run an Academic Requirement report and put together a tentative year-by-year plan.
3. If you are a transfer student, you should meet with an advisor to conduct a complete transfer credit evaluation once the university has evaluated your transcripts
4. You should check with your advisor to periodically revise your academic plan. There is a mandatory advisement during the semester when you are enrolled in EE 3020. The purpose of the advisement is to track the academic requirement and make sure you are aware of the courses you still need for fulfilling the program requirement.
5. You must also see an advisor before choosing your upper-division specialization.
6. You must see the Department Chair or a designated advisor to do your graduation check as part of your application for graduation. Refer to Section XIII for more details on applying for graduation.

During your first meeting with your advisor at the beginning of your program (a mandatory meeting), the faculty advisor reviews your course work related to the major and GE requirements for the degree. During this meeting, you can also work with the faculty advisor to develop a tentative year-by-year plan.

If you have transferred to the University from another institution, your transfer courses will be first evaluated by the admission office. After the initial evaluation, your transfer credits will be available on GET. You can review your transfer credit information on GET to see which courses are transferred and what are the CSULA equivalent courses. If you meet with an advisor before the admission office completes the initial evaluation of your transfer courses, the transfer credit information may not be available online. In these cases, the advising can be based on a tentative evaluation by the advisor on the basis of an unofficial transcript, which will be formalized later once the University has completed its evaluation. If the courses you took from another institution are not articulated (credits accepted but no equivalent CSULA course is assigned), you should see an advisor to evaluate your transcript to decide whether the transfer units can be used to fulfill any of the EE major requirements and if so, what the proper equivalent courses are.

After meeting with your faculty advisor during your first semester of attendance, you are urged to see your advisor each semester prior to registration. The purpose of these pre-registration meetings is to review your progress, to double check that you are meeting the prerequisites, and to provide an opportunity for you to discuss any questions you may have.

Mandatory advisement occurs at both the junior and senior level for all Electrical Engineering students. At the Junior level, all students enrolled in EE3020 which is a gate keeper signals and systems course, are required to attend department sponsored advisement workshops scheduled during every semester in the

academic year. Generally the department faculty in charge of advisement and the chair attend these mandatory sessions which focus on training the students to track their own degree progress using individualized advisement reports on the centralized advisement website (Golden eagle Territory (GET) system), and plan their schedules to achieve timely graduation. The mandatory junior level advisement is also meant to catch the students early enough to ensure they can be ready to register for the senior design sequence (the culminating one year course sequence). Timely registration in senior design is essential since the sequence is offered once a year and a student who does not have the proper prerequisites for the sequence is delayed one year before they can attempt to take the sequence again.

In addition to advising students on academic planning, each full-time faculty member or group of faculty members is responsible for coordinating one of the department advisement services as shown in Table 1.3. The outreach coordinator oversees the department’s outreach efforts to high schools and community colleges working closely with the College Outreach Coordinator. The transfer evaluation coordinator oversees EE transfer credit evaluations and works with the Department Chair to develop and maintain articulation agreements with local community colleges. The internship coordinator coordinates internship opportunities and student placements. The graduation evaluators and Department Chair are responsible for conducting graduation evaluations in GET one semester prior to a student’s anticipated graduation. The career counseling coordinator provides guidance on resume writing and interview skills to prospective students close to graduation and interact with the University Career Center. The graduate coordinator provides general advising related to the graduate program.

Table 1.3 - Advisement service coordinators.

Advisement Service	Coordinator
Outreach	Dr. Daneshgaran
Major Transfer Credit Evaluation	Drs. Liu, and Jamehbozorg
Internships	Dr. Tabrizi
Graduation Evaluation	Drs. Liu, Daneshgaran, and Jamehbozorg
Career Counseling	Drs. Won, Karimlou and Shahverdi
Graduate Program Advising	Drs. Jamehbozorg, Won and Daneshgaran

IV. HOW TO REGISTER

If this is your first registration, you must first see an advisor. Following advising, you obtain department approval to register. If you are a new student born after December 31, 1956 you must visit the Health Center where you will be asked to present proof of measles and rubella immunizations and verification of negative tuberculin test or chest x-ray within the past year. If you are 18 years of age or younger, you must provide proof of being immunized against the hepatitis B virus. Information can be obtained at the Health Center. Provided you are not trying to take any restricted courses (see description below), you are ready to pay your fees and register. Follow the schedule sent to you with the registration material.

New students must attend the University orientation session for new students. At that session, you will receive valuable information about the University and about registration. The information you receive at the University orientation session supplements that given by our faculty advisors.

Newly admitted students and continuing students can register using GET on the Internet. Instructions for using GET can be found in the Schedule of Classes. Your Personal Identification Number (PIN) should be sent to you. The PIN is the password to access GET and should be kept separately from your Campus Identification Number (CIN). You will not be allowed to register for classes if you have not completed the prerequisites. If you took the prerequisite at another university (other than a California Community College), the computer may not know that this is equivalent. In such cases, see an adviser or come to the department office. We can put an authorization into the computer so you will be able to register.

Adding classes is done using GET. To add during the first week, the class instructor would give the names of students adding the course to the Department Staff to issue permit in GET to allow students to register. If there is room in the class and it is not restricted, you can add without any constraints during this first week period (CAUTION: you must attend the first class meeting or the instructor can drop you from the class if already registered). If the class is full, or if you are adding during the second week of classes, you must obtain the instructor's permission to ADD. Once this permission is granted, the department clerical staff enters a code in the computer, which then permits you to add using GET. These permissions expire in several days, so do not delay adding. The Department Coordinator will e-mail you when the add permit is available for you to enroll using GET; it is important for you to provide the department with a current e-mail address which you check regularly in order for you to receive any important information from the department. Go to <http://www.calstatela.edu/registrar/university-scheduling-office> to find out the important dates from the Academic Calendar of a specific term.

Study Load: Undergraduate students must carry a study load of 12 units for full-time enrollment certification by the University. The recommended full-time study load for undergraduates is 15 units. The maximum study load is 18 units. This can only be exceeded with written department permission.

V. POLICY ON DROPPING CLASSES

Students withdraw from courses by filing a completed Petition to Withdraw form at Administration 409. Early in the semester (usually the first two weeks of a semester), students may simply drop classes on GET with no indication on their permanent academic record. After the "no-record drop" deadline, students may withdraw from any course during the regular drop period (usually till Week 13 of a semester), but the drop will be recorded as a "W" grade for the course on the official transcript. After the regular drop period ends, emergency-only withdrawal period begins for serious and compelling reasons.

These requests are granted only with the approval of the instructor and the department chair for regular drop, and the approval of the associate dean for emergency drop. Undergraduate students may withdraw from no more than 18 semester-units (27 quarter-units) attempted at Cal State Los Angeles.

Complete information about withdrawals, as well as withdrawal deadlines for each academic semester, appear at <http://www.calstatela.edu/registrar/university-scheduling-office>. Go to the specific term Academic Calendar for the information of deadlines.

VI. GENERAL EDUCATION PROGRAM

To be a University graduate implies a liberal education above and beyond technical skills. This need is universally recognized by such diverse bodies as the State of California, Tau Beta Pi (the Engineering honor society), and IEEE (the EE professional organization). This requirement for liberal education is also mandated by our University system and by the accrediting agency, ABET.

Our General Education (GE) Requirements are categorized into specific areas. These are delineated on the "GENERAL EDUCATION LOWER DIVISION COURSES FOR ENGINEERING MAJORS FORM" (see Section XV). The required courses in your Engineering major cover some of the required General

Education areas, and some variances have been permitted. Therefore, it is critical to realize that your General Education requirement is not the same as that of other majors on this campus. If you follow the University requirement without realizing this, **you may not be taking the correct courses**. GE courses for engineers total 21 units. These 21 units must include one race/ethnicity (*re*) course and one diversity (*d*) course, or two *re* courses in the Schedule of Classes section on GE.

The 21-unit lower-division GE requirement is divided as follows:

A - BASIC SUBJECTS (6 UNITS) - You must take an Oral Communication course and a Written Communication course.

AMERICAN INSTITUTIONS (6 UNITS) - You must take a U.S. History course and POLITICAL SCIENCE 1000.

B - NATURAL SCIENCES (0 UNITS) – All met by the major courses. No additional courses required.

C - HUMANITIES (3 UNITS) – Select one course in C1 Arts.

D - SOCIAL SCIENCES (3 UNITS) – Select one course.

E - LIFELONG UNDERSTANDING (3 UNITS) – First-time freshmen need to take ENGR 1500 Introduction to Engineering and Technology (3); Transfer students without equivalent credit need to select one course (3) with a civic learning (*cl*) component in Block E.

There is no Upper Division GE requirement in the BSEE program.

You need to use the US History, C1 and D courses to fulfill the requirement of one race/ethnicity (*re*) and one diversity (*d*) courses, or two *re* courses.

Do not consider your GE courses as distasteful chores; they are necessary and vital parts of your education and should provide a rewarding learning experience. Social forces and humanistic considerations have a considerable impact on the work and the lives of engineers (and vice versa). GE courses are designed to help you understand these phenomena and prepare you to deal with the many non-technical realities you will face in the "real world".

VII. LOWER DIVISION REQUIREMENTS

This is a first of three sections describing the requirements in the major.

The Lower Division requirements consist of the following 42 units:

CHEM 1040	General Chemistry for Engineers (4)
EE 2040	Circuit Analysis I (3)
EE 2049	Electrical Measurements and Circuits Laboratory (1)
EE 2440	Digital Engineering (3)
EE 2449	Digital Logic Laboratory (1)
EE 2450	Embedded System Programming I (3)
MATH 2110	Calculus I (4)
MATH 2120	Calculus II (4)
MATH 2130	Calculus III (3)
MATH 2150	Differential Equations (3)
PHYS 2100	General Physics I, Mechanics (5)
PHYS 2200	General Physics II, Electromagnetism and Circuits (5)

ENGL 2030 **Introduction to Technical Writing (3)**

The prerequisites for each of these courses are listed in the University catalog and Section X. You **MUST** have the prerequisite before taking any class. The only exception is if the course instructor completes and signs a prerequisite waiver form which is also signed by Chairperson of the department. This form must be submitted to the EE department to become a permanent part of your file.

It is extremely important that you complete the 4 required MATH courses (Calculus and Differential Equations) and the 2 required PHYSICS courses as soon as possible. The reason for this becomes obvious when you check prerequisites in the catalog. For example, EE 2040-Circuits Analysis I is a prerequisite for most Electrical Engineering courses, while Math 2120 and Phys 2200 have to be taken prior to or currently with EE 2040.

Prior to taking your first Math course on this campus, you need to know in which Math Placement Category you are placed (See Section XI). You may also go to a Professional Advisor in ECST Advising Center for advisement.

VIII. UPPER DIVISION REQUIREMENTS

The 42 units of upper division required courses are listed below:

EE/ME/CE 3000	Economics for Engineers (3)
EE/ME/CE 3010	Ethics and Professionalism in Engineering (3)
EE 3020	Signals and Systems (3)
EE 3030	Circuit Analysis II (3)
EE 3040	Probability, Random Variable, and Random Processes (3)
EE 3050	Electric and Magnetic Fields (3)
EE 3200	Analog Communication Systems (3)
EE 3300	Electric Machines (3)
EE 3450	Embedded Systems Programming II (3)
EE 3600	Control Systems I (3)
EE 3700	Electronics I (3)
EE 3810	Sensors, Data Acquisition, & Instrumentation w/ App. in Biomedical Engr. (3)
EE 4961	Senior Design I (3)
EE 4962	Senior Design II (3)

Notes on Senior Design:

- EE4961 and EE 4962 are offered as a 2-semester sequence starting from Fall semester. The College of ECST has been working hard to provide practical design experience for our students. Currently, most of the senior design projects are real-world projects that are sponsored by various companies. During the first senior design course, EE 4961, you will be asked to rank your preferred projects and you will be assigned to work on one based on your interest, your skill sets as well as the inputs from the faculty and industry liaisons. During the senior design sequence, you will learn the project design and project management skills while working on the assigned project in a team environment and you will meet with your faculty advisor and industry liaison periodically. Each project team needs to make a presentation at the Senior Design Expo by the end of Spring semester (EE4962).
- To make sure that you are eligible to take EE 4961 and EE 4962 at your senior year, plan well to take all prerequisite courses and preferably co-requisites ahead of time. See Section X for the prerequisites.

- Also, in your study plan, make sure to take courses that will prepare you for the technical aspects of your specific project before taking the senior design courses. These courses will likely be in your area of specialization but can also be courses which tend to be more generally applicable to most senior design projects.

IX. ELECTIVES

As an Electrical Engineering major, you choose 17 units of elective courses. These courses should be selected with the help of an advisor, and based upon interests that you develop while taking the required courses.

Electives fall within 2 categories as follows:

Technical Electives	7 units	(2 lectures, 1 laboratory)
Upper Division Specialization	10 units	(3 lectures, 1 laboratory)

You select Technical Electives and Upper Division Specialization from the following list.

ELECTIVE LECTURES (15 units)

EE 3710	Electronics II (3)
EE 3720	Digital Electronics (3)
EE 4130	Systems Engineering (3)
EE 4200	Digital Communication Systems (3)
EE 4210	Coding for Communications (3)
EE 4220	Digital Signal Processing (3)
EE 4230	Antennas (3)
EE 4240	Fiber Optics (3)
EE 4250	Digital Image Processing (3)
EE 4300	Introduction to Power Systems Engineering (3)
EE 4310	Power Systems Analysis (3)
EE 4320	Electric Power Distribution (3)
EE 4330	Power Electronics (3)
EE 4340	Electromagnetic Energy Conversion (3)
EE 4400	Data Communications and Networking (3)
EE 4420	Multimedia Networking (3)
EE 4440	Computer Organization (3)
EE 4450	Embedded Architectures (3)
EE 4480	Advanced Digital Design (3)
EE 4600	Control Systems II (3)
EE 4610	Digital Control Systems (3)
EE 4620	Modern Control Systems (3)
EE 4710	Analog Integrated Circuits (3)
EE 4720	CMOS VLSI Design (3)
EE 4730	Optoelectronics (3)
EE 4810	Biomedical Devices (3)
EE 4820	Biomedical Signal Processing (3)

ELECTIVE LABORATORIES (2 units):

EE 3209	Communications Laboratory (1)
EE 3309	Electromagnetic Energy Conversion Laboratory (1)
EE 3709	Electronics Laboratory (1)
EE 4229	Digital Signal Processing Laboratory (1)
EE 4689	Control Systems Laboratory (1)

Additional Courses That May Count Towards Major with Department Approval:

EE 1540	Special Topics in Electrical Engineering (1-3)
EE 2540	Special Topics in Electrical Engineering (1-3)
EE 2801	Intro to Biomed Engineering (3)
EE 3001	Numerical Analysis and Modeling Using MATLAB (1)
EE 3445	Computer Organization (3)
EE 3540	Special Topics in Electrical Engineering (1-3)
EE 4009	Professional Engineering Practice (1)
EE 4540	Special Topics in Electrical Engineering (1-3)
EE 4990	Undergraduate Directed Study (1-3)

UPPER DIVISION SPECIALIZATION

You must select one of the following six areas of specialization. You should meet with your advisor to discuss this selection.

Communications	Control Systems
Computers	Electronics
Power	Biomedical Engineering

Courses in each of these areas come from the list of technical electives presented above. Once you choose an area of specialization, you will be required to take three classes and one laboratory from that area. You are free to choose any specialization you wish, and you do not need approval to change specialization. However, you will NOT GRADUATE unless you meet the requirements of at least one area of specialization. Therefore, even though you do not need approval to change, it would be wise to discuss this with an advisor if you have any questions. If you are interested in more than one area, do not be concerned since you still have additional elective units that permit you to select courses in areas beyond your selected specialization.

Communications	Controls
You must take EE 4200 and choose two courses from the list below. In addition, select one of the two labs listed.	You must take all the courses listed below:
EE 4230 Antennas	EE 4600 Control Systems II
EE 4210 Coding for Communications	EE 4610 Digital Control Systems
EE 4220 Digital Signal Processing	EE 4620 Modern Control Systems
EE 4240 Fiber Optics	
EE 4250 Digital Image Processing	EE 4689 Control Systems Lab
EE 4400 Data Communications & Networking	
select either:	

EE 3209 Communications Lab	
or	
EE 4229 Digital Signal Processing Lab	
Computers	Biomedical
You must take EE 4440 and choose two other courses from the list below.	You must take EE 4810 and EE 4820, and choose one more course from the list below.
EE 4400 Data Communications & Networking	EE 4200 Digital Communication Systems
EE 4420 Multimedia Networking	EE 4220 Digital Signal Processing
EE 4450 Embedded Architectures	EE 4250 Digital Image Processing
EE 4480 Advanced Dig Design	EE 4710 Analog Integrated Circuits
	EE 4720 CMOS VLSI Design
	EE 4600 Control Systems II
Power	Electronics
You must take EE 4300, EE 4310, and EE 3309 (lab). In addition, select one course from the list below:	You must take EE 3710, EE 3720, and EE 3709 (lab). In addition, select one course from the list below:
EE 4320 Electric Power Distribution	EE 4710 Analog Integrated Circuits
EE 4340 Electromagnetic Energy Conversion	EE 4720 CMOS VLSI Design
EE 4330 Power Electronics	EE 4730 Optoelectronics
	EE 4330 Power Electronics

X. PREREQUISITES

The previous sections have listed the required and elective courses in the major. All of the prerequisites to these courses can be found by referring to the current University Catalog, or to updated supplements issued by the Department. As courses evolve, prerequisites can sometimes change. You are responsible for having the prerequisites currently in effect for the courses you are taking.

Changing the prerequisites may not seem fair since it may require altering your projected program from time to time. However, the alternatives are for us to never change course content, or for you to enter a class without the proper preparation. Neither alternative is acceptable. We endeavor to make prerequisite changes only when absolutely necessary.

A course being a "*Pre-req or Co-req*" of another course means that it may be taken prior to or concurrently with the other course. For example, EE 2040 lists MATH 2120 and PHYS 2200 as *Pre-req or Co-req*. This means that, to enroll in EE2040, you must have already completed MATH 2120 and PHYS 2200 or at least taking those two courses currently with EE 2040.

Current course prerequisites are listed below.

COURSE PREREQUISITE

Lower Division Major Requirements

CHEM 1040	General Chemistry for Engineers (4) <i>Prerequisites:</i> Must be Engineering major and have a score of 50 or more on (or exempt from) ELM or MATH 0930 with min C grade
EE 2040	Circuit Analysis I (3) <i>Pre-req or Co-req:</i> MATH 2120, PHYS 2200
EE 2049	Electrical Measurements and Circuits Laboratory (1) <i>Prerequisites:</i> EE 2040
EE 2440	Digital Engineering (3) <i>Prerequisites:</i> None
EE 2449	Digital Logic Laboratory (1) <i>Pre-req or Co-req:</i> EE 2440

EE 2450	Embedded System Programming I (3) <i>Prerequisites:</i> ENGR 1500
MATH 2110	Calculus I (4) <i>Prerequisites:</i> Grade C or better in MATH 1040, or MATH 1083 combined with any of ESM 1082, MATH 1081 or 1082; or satisfactory score on placement examination. <i>Co-requisite:</i> MATH 2111 with same section number if any of the prereq. courses is graded below B-
MATH 2120	Calculus II (4) <i>Prerequisites:</i> MATH 2110 with a minimum C grade; students with a grade of less than B- in MATH 2110 must enroll concurrently in MATH 2121.
MATH 2130	Calculus III (3) <i>Prerequisites:</i> MATH 2120 with a minimum C grade; students with a grade of less than B- in MATH 2120 must enroll concurrently in MATH 2131
MATH 2150	Differential Equations (3) <i>Prerequisites:</i> MATH 2130
PHYS 2100	General Physics I, Mechanics (5) <i>Prerequisites:</i> MATH 2110 with a minimum C grade
PHYS 2200	General Physics II, Electromagnetism and Circuits (5) <i>Prerequisites:</i> PHYS 2100 with a minimum C grade
ENGL 2030	Introduction to Technical Writing (3) <i>Prerequisites:</i> ENGL 1010 or equivalent

Upper Division Major Requirements

EE/ME/CE 3000	Economics for Engineers (3) <i>Prerequisites:</i> Junior or Senior Standing
EE/ME/CE 3010	Ethics and Professionalism in Engineering (3) <i>Prerequisites:</i> Junior or Senior Standing
EE 3020	Signals and Systems (3) <i>Prerequisites:</i> EE 2040, Pre-req or Co-req: MATH 2150
EE 3030	Circuit Analysis II (3) <i>Prerequisites:</i> EE 3020
EE 3040	Probability, Random Variable, and Random Processes (3) <i>Pre-req or Co-req:</i> MATH 2130
EE 3050	Electric and Magnetic Fields (3) <i>Prerequisites:</i> EE 2040
EE 3200	Analog Communication Systems (3) <i>Prerequisites:</i> EE 3020
EE 3300	Electric Machines (3) <i>Prerequisites:</i> EE 2040
EE 3450	Embedded Systems Programming II (3) <i>Prerequisites:</i> EE 2450, EE 2449
EE 3600	Control Systems I (3) <i>Prerequisites:</i> EE 3020
EE 3700	Electronics I (3) <i>Prerequisites:</i> EE 2040
EE 3810	Sensors, Data Acquisition, & Instrumentation w/ App. in Biomedical Engr. (3) <i>Prerequisites:</i> EE 2049
EE 4961	Senior Design I (3) <i>Prerequisites:</i> Completion of blocks A and B4, an additional course from block B, and at least one course each from blocks C and D; EE3020;EE3450;EE3000;EE3010; <i>Pre-req or Co-req:</i> EE 3810.
EE 4962	Senior Design II (3) <i>Prerequisites:</i> EE 4961 with grade of C or higher

Upper Division Technical Electives

Lecture Electives

EE 3710	Electronics II (3) <i>Prerequisites:</i> EE 3700
EE 3720	Digital Electronics (3) <i>Prerequisites:</i> EE 2440, EE 3700
EE 4130	Systems Engineering (3) <i>Prerequisites:</i> EE 3600
EE 4200	Digital Communication Systems (3) <i>Prerequisites:</i> EE 3200, EE 3040
EE 4210	Coding for Communications (3) <i>Prerequisites:</i> EE 3200
EE 4220	Digital Signal Processing (3) <i>Prerequisites:</i> EE 3200
EE 4230	Antennas (3) <i>Pre-req or Co-req:</i> EE 3050
EE 4240	Fiber Optics (3) <i>Prerequisites:</i> EE 3200
EE 4250	Digital Image Processing (3) <i>Prerequisites:</i> EE 3200
EE 4300	Introduction to Power Systems Engineering (3) <i>Prerequisites:</i> EE 3300
EE 4310	Power Systems Analysis (3) <i>Prerequisites:</i> EE 4300
EE 4320	Electric Power Distribution (3) <i>Prerequisites or Co-requisites:</i> EE 4300
EE 4330	Power Electronics (3) <i>Prerequisites:</i> EE 3700
EE 4340	Electromagnetic Energy Conversion (3) <i>Prerequisites:</i> EE 3300
EE 4400	Data Communications and Networking (3) <i>Prerequisites:</i> EE 3200
EE 4420	Multimedia Networking (3) <i>Prerequisites:</i> EE 4400, Knowledge of MATLAB

EE 4440	Computer Organization (3) Prerequisites: EE 3450
EE 4450	Embedded Architectures (3) Prerequisites: EE 3450
EE 4480	Advanced Digital Design (3) Prerequisites or Co-req: EE 4440
EE 4600	Control Systems II (3) Prerequisites: EE 3600
EE 4610	Digital Control Systems (3) Prerequisites: EE 3020
EE 4620	Modern Control Systems (3) Prerequisites: EE 3020
EE 4710	Analog Integrated Circuits (3) Prerequisites: EE 3700
EE 4720	CMOS VLSI Design (3) Prerequisites: EE 3720
EE 4730	Optoelectronics (3) Prerequisites: EE 3700
EE 4810	Biomedical Devices (3) Prerequisites: EE 2040
EE 4820	Biomedical Signal Processing (3) Prerequisites: EE 3020

Laboratory Electives

EE 3001	Numerical Analysis and Modeling Using MATLAB (1) Prerequisites: EE 2040
EE 3209	Communications Laboratory (1) Prerequisites: EE 3200
EE 3309	Electromagnetic Energy Conversion Laboratory (1) Prerequisites: EE 3300, EE 2049
EE 3709	Electronics Laboratory (1) Pre-req or Co-req: EE 3710
EE 4009	Professional Engineering Practice (1) Prerequisites: Department Permission under the conditions: acceptance by the corresponding worksite; junior, senior, or graduate standing; min 2.5 GPA for undergraduates and 3.0 for graduates.
EE 4229	Digital Signal Processing Laboratory (1) Prerequisites: EE 3020, Pre-req or Co-req: EE 4220
EE 4689	Control Systems Laboratory (1) Pre-req or Co-req: EE 3600

XI. MATH PLACEMENT CATEGORIES IN STEP

When students are admitted to Cal State LA, the university looks at a variety of measures to determine their Math Placement Category. These multiple measures include high school Math courses, high school grade point averages (GPA); and exams scores from the ACT, SAT, SAT Subject test, or the California Assessment of Student Performance and Progress (CAASPP). Note that the ELM exam will no longer be administered. CSU places students into four categories in Math.

All incoming freshmen in the College of ECST will be placed in the following three Math Categories in the Summer Transition to ECST Program (STEP):

Category 1 - GE Requirement Completed: Students have already fulfilled the General Education requirement in Math. Most of the students in Category 1 received a passing score on the AP or IB exam, and received credit for the college course. All students planning to take the AP Calculus Exam or who already took it and have not received their score, should complete a STEP application as soon as possible to secure a space in the program. *Category 1 students are not required to take Early Start.*

Category 2 - Academic support course not needed with GE course: Students are ready to take the freshmen-level GE course in Math (College Level Math). College level math is NOT Calculus 1. In order for ECST incoming freshmen to start in Calculus 1, they must attend STEP and place in Math 2110 by the end of the program. *Category 2 students are not required to take Early Start.*

Category 3 - Academic support course recommended with GE course: Students will begin their college-level Math in their first semester and will be placed into a co-requisite support course (Math). College level math is NOT Calculus 1. In order for ECST incoming freshmen to start in Calculus 1, they must attend STEP and place in Math 2110 by the end of the program. *Category 3 students are not required to take Early Start.*

See <http://www.calstatela.edu/ecst/success/summer-transition-ecst-program-step> for more details.

XII. PROFESSIONAL ACTIVITIES

The Department offers opportunities to supplement classroom instruction for the purposes of preparing you to enter into the profession upon graduation. The campus chapter of the Institute of Electrical and Electronics Engineers (IEEE) is one such opportunity. The Institute of Electrical and Electronics Engineers is a professional society for Electrical and Computer Engineers. The IEEE was founded in 1884 and is the world's largest professional engineering society. Its purposes are summarized as follows:

- A. IEEE is a **SCIENTIFIC AND EDUCATIONAL** organization directed toward the advancement of the theory and practice of electrical engineering, electronics, computer engineering, and the allied branches of engineering and the related arts and sciences. The IEEE publishes journals in the various disciplines and holds meetings and conferences for the reading and discussion of professional papers.
- B. IEEE is a **PROFESSIONAL** organization directed toward the advancement of the standing of the members of the professions it serves. The IEEE conducts and publishes surveys and reports on matters of professional concern to the members, collaborates with public bodies and with other societies for the benefit of the Engineering profession as a whole, and establishes standards of qualification and ethical conduct.
- C. IEEE strives to enhance the quality of life for all people throughout the world through the constructive application of technology. It endeavors to promote understanding of the influence of such technology on the public welfare.

Everyone preparing to enter the electrical and electronics field is invited to join the thousands of engineers and students who are members of IEEE (<http://iee.org/>). The campus chapter of IEEE at Cal State LA is a very active chapter. The Department Faculty is fully committed to supporting the chapter and encourages every student to participate in its activities. As a student member of this chapter, your dues are only a fraction of the regular member dues, and they entitle you to all of the privileges of membership. The chapter schedules periodically meetings, where engineering leaders from the many companies located in our area present technical talks. Participation in the campus chapter activities enhances your future career by offering leadership experience, and activities such as field trips, employment seminars, and design projects. It also allows you to meet socially with your professional peers and faculty members.

As a student member, you receive a membership pin and membership card, as well as **POTENTIALS**, the IEEE student magazine. This publication focuses upon the student members' needs and concerns while in school and as they prepare to become working members of the profession. Also included with student membership is the world acclaimed technical magazine, **SPECTRUM**.

A student member is eligible to compete in design paper contests sponsored by IEEE. A student can win recognition and cash awards through competition that emphasizes communication and technical skills. Students in the department are encouraged to submit entries in the Southern California **TECHNICAL PAPER CONTEST**. Most electrical engineering schools in Southern California participate in this contest. Cal State LA winners have gone on to compete with finalists from other areas and have won recognition at the Western Regional Level (including Hawaii and Alaska).

If you are not currently a member, the Faculty of this Department strongly recommend that you join and take advantage of all the benefits that membership confers. To join, go to <http://www.ieee.org>, on the membership page, click on "Join IEEE as a student member".

XIII. APPLYING FOR GRADUATION

Well, you look like you are going to make it. You have followed the instructions in this handbook, and can now see the light at the end of the tunnel. You appear to be close to graduation. But graduation does not happen automatically--YOU MUST APPLY for it. Application forms are available in Administration 409. You fill out the application form and meet with the advisor to do the grad check then take it to the cashier and pay the fees. The deadlines are published on <http://www.calstatela.edu/graduation>. Generally, you must apply two semesters ahead of your expected graduation date. In your meeting with the Department Chair or designated advisor, you discuss your program and projected schedule. The faculty advisor or department chair will evaluate your academic record in GET system to see your progress towards graduation. Do not wait until the last minute to apply for graduation! After the initial evaluation conducted by the department, your graduation application is sent to the University Graduation Office for review and approval. After reviewing your graduation application, the Graduation Office updates the website with the latest information about your status. If there are no remaining requirements, you are ready to graduate.

Before approving your application, the Graduation Office checks to see if you have completed all requirements and have earned a C average (2.0) or better in the following categories:

- a) All university- and college-level work (including transferred courses).
- b) All work taken at Cal State LA.
- c) All courses taken to satisfy requirements *in the major*.

It is important that you be aware of the last category. Students who have an overall GPA at Cal State LA of even slightly above 2.0 are considered (by the University) to be doing acceptable work in their courses. So, even if their work *in the major* is below 2.0, they will not be placed on probation or disqualified. Therefore, unless you keep track of your performance in the major, you may be in for a shock when you are told at grad-check time that a grade-point deficiency exists and graduation will be delayed. So, if you think you might be in trouble in the major, see your advisor right away for a preliminary "check-up"--don't set yourself up for an unwanted surprise.

Students are encouraged to track their own progress towards graduation on GET. GET allows you to add/drop classes, check your grades and do a quick degree audit. If you need help with GET system, you can go to the ITS help desk located at Library South. If you see any discrepancy in your GET record, you should go to an advisor for help.

XIV. ACADEMIC STANDARDS

You are now joining an academic community. Along with the privileges of membership go certain obligations. Failure to meet established standards may result in various penalties. In extreme cases this could result in expulsion from the University.

We hope that behavior standards never become an issue, but it is important that you prove worthy of the trust we place you in. Honesty is extremely important both for the operation of the University and for your personal development. More details about "Student Conduct" can be found in Schedule of Classes.

XV. FORMS

GENERAL EDUCATION ADVISEMENT FORM

CATEGORY/COURSE	TRANSFERRED FROM		SEMESTER UNITS	GRADE	REMARKS
	INSTITUTION	COURSE			
I. LOWER DIVISION GENERAL EDUCATION AND UNIVERSITY REQUIREMENT (21 units) (please skip to Part II if the Lower Division GE is entirely completed and certified at a community college.)					
BLOCK A: BASIC SUBJECTS (6 units)					
A1: ORAL COMM (3)					
A2: WRITTEN COMM (3)					
AMERICAN INSTITUTIONS (6 units)					
U.S. HISTORY (3)					
U.S. CONSTITUTION AND STATE/LOCAL GOVERNMENT (3)					
BLOCK C: HUMANITIES (3 units) Select one course from C1					
C1: ARTS AAAS 2200(re); ART 1011, 1012, 1013, 1500; ART 1520, 1550, 1590, 2090(d), 2100; CHS 1600(re), 2050(re), 2060(re) ENGL 2070, 2260, 2800; HNRS 1200; LBS 2340(re), 2666(d) MUS 1500, 1510, 1520, 1530, 1560, 1570; PAS 2210(re), 2600(re); PHIL 2400(d) TVF 2260, 2666(d)					
BLOCK D: SOCIAL SCIENCES (3 units) Select one course					
AAAS 1400(re), 1600(d), 1700(d), 2000(d), 2100(re), 2630(re) ANTH 1500(d), 1700, 2300; BUS 2500(d), CHS 1500(re), 2100(re), 2200(d), 2300(re) COUN 2020(d); ECON 1500; ENGL 2100 GEOG 1550(d) HIST 1010(d), 1020(d), 1600(d) HNRS 1300(cl), 2300 LAS 1020(re), 1400(re), 1500(d), 2550(d) PAS 1020(re), 1400(re), 1800(re), 2500(re) POLS 2500; PSY 1500 SOC 2010(d); 2630(re); TVF 2500(d) URBA 1800; WGSS 2000(cl)(d), 2030(re)					
BLOCK E: LIFELONG UNDERSTANDING AND SELF-DEVELOPMENT (3 units)					
ENGR 1500(IHE)(cl)					
II. LOWER DIVISION GENERAL EDUCATION CERTIFICATION					
<input type="checkbox"/> GE Certification					

<p>GENERAL EDUCATION NOTES</p> <ul style="list-style-type: none"> * A minimum C grade average in GE is required of all students following fall 2016 or any later catalog. * Students need to select the US History, C1, and D courses to fulfill the requirement of one race/ethnicity (re) and one diversity (d) course, or two re courses. * First-time freshmen need to take ENGR 1500 Introduction to Higher Education for Engineers and Technologists (3); Transfer students without equivalent credit need to select 1 course (3) in Block E.

Advisor: _____

Date: _____

Department Chair: _____

Date: _____



Lower Division GE Requirement for Engineering Majors

Effective: Fall Semester 2016

A Basic Subjects 6 Units Total	American Institutions 6 Units Total	B Natural Sciences and Mathematics / Reasoning 0 Units Total	C Arts and Humanities 3 Units Total	D Social Sciences 3 Units Total	E Lifelong Understanding and Self-Development 3 Units Total
A1 ORAL COMM (3 units)	U.S. HISTORY (3 units)	B1 PHYSICAL	C1 ARTS		
COMM 1100 HNRS 1100	AAAS 1500(re) CHS 1200(re)	Met in Major	AAAS 2200(re) ART 1011, 1012, 1013, 1500, 1520, 1550, 1590, 2090(d), 2100	AAAS 1400(re), 1600(d), 1700(d), 2000(d), 2100(re), 2630(re)	ENGR 1500(IHE)(cl) for Freshmen
A2 WRITTEN COMM (3 units)	HIST 1500(re), 2010(d), 2020(d), 2050(re)	B2 BIOLOGICAL		ANTH 1500(d), 1700, 2300	Other courses for Transfer Students: ART 2400 (d)
ENGL 1005B, 1010		Met in Major		BUS 2500(d)	COMM 2100
A3 CRITICAL THINKING AND COMPOSITION (0 unit)	U.S. CONSTITUTION STATE / LOCAL GOV'T ** (3 units)	B3 INTERDISCIPLINARY PHYSICAL / BIOLOGICAL*		CHDV 1400, 1410, 2250(d) CHS 1500(re), 2100(re), 2200(d), 2300(re)	LIBR 2300, 2500 NTRS 2100, 2500, PHIL 2300 (d) PSY 1600, SOC 1001 (d)
Met in major	PAS 1510(re) POLS 1000		ENGL 2070, 2260, 2800 HNRS 1200	COUN 2020(d) ECON 1500	CHDV/SOC 1200 (d) BUS 2000
		B4 MATHEMATICS / QUANTITATIVE REASONING		ENGL 2100 GEOG 1550(d)	
		Met in Major	LBS 2340(re), 2666(d) MUS 1500, 1510, 1520, 1530, 1560, 1570 PAS 2210(re), 2600(re) PHIL 2400(d) TVF 2260, 2666(d)	HIST 1010(d), 1020(d), 1600(d), HNRS 1300(cl), 2300	
			C2 HUMANITIES	LAS 1020(re), 1400(re), 1500(d), 2550(d)	
			Met by EE/ME/CE 3010	PAS 1020(re), 1400(re), 1800(re), 2500(re)	
				POLS 2500 PSY 1500 SOC 2010(d), 2630(re) TVF 2500(d) URBA 1800 WGSS 2000(cl)(d), 2030(re)	
Lower Division GE Course Guide					
Block Completion Requirements					
A 1 Course each A1, A2; A3 met in Major					
B <i>Block B requirements met in Major</i>					
C 1 Course in C1; C2 met by Engineering Ethics					
D 1 Courses					
E 1 Course (ENGR1500)					
AM 1 Course US History 1 Course US Constitution/ State & Local Government <i>**Transfer students that have completed the US Constitution requirement and not the State & Local Government requirement, may take POL 2000 in place of POL 1000</i>					
NOTES FOR GENERAL EDUCATION LOWER DIVISION COURSES					
<ul style="list-style-type: none"> • An Introduction to Higher Education course (IHE) is required of all first-time freshmen. • A minimum C grade in A1, A2, A3, and B4 classes is required. A 'C-' grade is not acceptable. • A minimum C grade average in general education is required of all students following the Fall 2016 or later catalog. • Civic Learning/Community Engagement Requirement (6 semester units). One (cl) course must be completed at the upper division general education level. These courses are designated as (cl) after the course listing. • Diversity Requirement (6 semester units). Students must complete one race/ethnicity (re) course and one diversity (d) course or another race/ethnicity (re) course. These courses are designated as (re) and (d) after the course listing. • Writing Intensive Requirement (6 semester units). Students must complete two writing intensive (wi) courses, with at least one in their major. These courses are designated as (wi) after the course listing. 					

XVI. ROADMAPS

**Sample 4 year plan for Freshman Students for the Bachelor of Science Degree in Electrical Engineering
(Total: 122 Units)**

	Fall _____	Spring _____	Total
Year 1	ENGR 1500 (3) – Intro to Engr./Tech MATH 2110 (4) – Calculus I COMM 1100 (3) – Oral Comm. CHEM 1040 (4) – General Chemistry for Engineers ENGL 1010 (3) – Accelerated College Writing TOTAL: (17)	MATH 2120 (4) – Calculus II ENGL 2030 (3) – Intro to Tech Writing PHYS 2100 (5) – General Physics I EE 2440 (3) – Digital Engineering EE 2449 (1) – Digital Logic Lab TOTAL: (16)	33
Year 2	MATH 2130 (3) – Calculus III PHYS 2200 (5) – General Physics II EE 2040 (3)* -- Circuit Analysis I EE 2450 (3) – Embedded Sys. Programming I US History (3) TOTAL: (17)	MATH 2150 (3) – Diff. Equation EE 2049 (1) – Electrical Measurements and Circ Lab EE 3020 (3)* -- Signals and Systems EE 3300 (3) – Electric Machines POLS 1000 (3) Government and American Society EE 3010 (3) – Ethics & Professionalism in Eng TOTAL: (16)	33
Year 3	EE 3040 (3) – Probability, Random Variable, and Random Processes EE 3450 (3) – Embedded Sys. Programming II EE 3000 (3) – Econ for Engineers EE 3810 (3) – Sensors & Instrumentation in BME GE: SOCIAL SCIENCE (3) TOTAL: (15)	EE 3600 (3) – Control Sys. I EE 3700 (3) – Electronics I EE 3200 (3) – Analog Comm. Sys. EE 3030 (3) – Circuit Analysis II EE ELECTIVE (3) EE ELECTIVE LAB (1) TOTAL: (16)	31

Year 4	EE 4961 (3) – Senior Design I EE 3050 (3) – Electric & Magnetic Fields EE ELECTIVE (3) EE ELECTIVE (3) EE ELECTIVE LAB (1) TOTAL: (13)	EE 4962 (3) – Senior Design II EE ELECTIVE (3) EE ELECTIVE (3) GE: HUMANITIES (3) TOTAL: (12)	25
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**Sample 2 year plan for Transfer Students for the Bachelor of Science Degree in Electrical Engineering
(Total: 122 Units including Transfer Units)**

	Fall _____	Spring _____	Total
Year 3	EE 3020 (3)* -- Signals and Systems EE 3300 (3) – Electric Machines EE 3010 (3) – Ethics and Professionalism in Eng ENGL 2030 (3) – Intro to Tech Writing EE 3450 (3) – Embedded Sys. Programming II TOTAL: (15)	EE 3600 (3) -- Control Sys. I EE 3700 (3) – Electronics I EE 3200 (3) – Analog Comm. Sys. EE 3810 (3) -- Sensors & Instrumentation in BME EE 3000 (3) – Econ for Engineers EE 3030 (3) – Circuit Analysis II TOTAL: (18)	36
Year 4	EE 4961 (3) – Senior Design I EE 3050 (3) -- Electric & Magnetic Fields EE 3040 (3) – Probability, Random Variable, and Random Processes EE ELECTIVE (3) EE ELECTIVE (3) EE LAB ELECTIVE (1) TOTAL: (16)	EE 4962 (3) – Senior Design II EE ELECTIVE (3) EE ELECTIVE (3) EE ELECTIVE (3) EE LAB ELECTIVE (1) GE SOCIAL SCIENCE (cl) (3) TOTAL: (16)	32

Assumes transfer credit received for the following courses (Equivalent of 57 Units):

ENGL 1010 (3)	CHEM 1040 (4)	EE 2040 (3)*
COMM 1100 (3)	MATH 2110 (4)	EE 2049 (1)
US History (3)	MATH 2120 (4)	EE 2440 (3)
POLS 1000 (3)	MATH 2130 (3)	EE 2449 (1)
GE Humanities (3)	MATH 2150 (3)	EE 2450 (3)
GE Block E (3)	PHYS 2100 (5)	
	PHYS 2200 (5)	
<u>Total: 18 Units</u>	<u>Total: 28 Units</u>	<u>Total: 11 Units</u>

UD GE Requirements: Transfer students shall take UD GE courses to meet diversity (d), Race/Ethnicity (re) and Civic Learning (cl) requirements. It is recommended to select GE courses with (d), (re), and (cl) designation from available course list. Courses with * are gate keeper courses and students should take them as soon as possible to avoid delays in graduation.