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CALIFORNIA STATE UNIVERSITY, LOS ANGELES

Department of Mechanical Engineering
Undergraduate Student Handbook
Bachelor of Science in Mechanical Engineering

Effective Fall Semester 2018

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.

Prepared by the Faculty of the Department of Mechanical Engineering

Undergraduate Student Handbook

Department of Mechanical Engineering

2018-2019

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I. INTRODUCTION

Welcome to the Department of Mechanical Engineering at California State University, Los Angeles. The faculty members of the department are pleased to provide you with this informational 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/classschedule/.

THE MECHANICAL ENGINEERING PROFESSION

What is mechanical engineering?

Mechanical engineers are often associated with cars; however mechanical engineers deal with much more than cars! In fact, mechanical engineering is a broad discipline that is concerned with the application of scientific principles and laws to the development of anything that moves. A mechanical engineer is involved in design, synthesis, development, and refinement of devices, machines, systems or processes that vary widely in nature, size, and scope. A mechanical engineer is required to understand the laws of nature to accomplish these important tasks and play a leading role in the advancement of technology.

What does a mechanical engineer do?

Mechanical engineers are expected to face many technical and managerial challenges, such as:

- Design, fabricate, and testing of prototypes
- Research and development of new technologies
- Process and product improvement
- Technical marketing
- Oversee machine and facility operations
- Supervise engineering teams

What is the mission of Department of Mechanical Engineering?

To provide our students with innovative learning experiences and service opportunities and to graduate well educated professionals who are prepared to meet the challenges of a rapidly changing world.

What is your expected outcomes after you graduate?

Our graduates have

- 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 function on multidisciplinary 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.

AREAS OF FOCUS

Materials Science and Mechanics

The courses offered in this area will provide the fundamental basis in metallurgy, mechanics, plasticity and fracture, mechanisms, manufacturing, machine design, and material selection.

Thermal-Fluid Systems Engineering

The courses offered in this area will provide knowledge in thermal sciences (thermodynamics, fluid mechanics, and heat transfer), with emphasis in energy conversion, combustion, aerodynamics, and heating, ventilation, and air-conditions systems.

Biomechanical Engineering

The courses offered in this area will provide students with an understanding of biomechanics, biomaterials, rehabilitation engineering, tissue engineering, systems physiology, biomedical instrumentation, orthopaedic implants and devices, and neural engineering.

Dynamics and Control

The courses offered in this area will provide the fundamentals in mechanical measurement, instrumentation, dynamics, kinematics, vibration, control, and robotics.

CHOOSING YOUR TECHNICAL ELECTIVES

Introductory courses in all areas of mechanical engineering are included in the Required Courses. These courses will give you an overview of the field and help you select an area in which you would like to specialize. You can continue taking courses in any area of interest in mechanical engineering and are encouraged to meet with a faculty advisor to assist with the selection of your technical elective courses.

PLANNING FOR GRADUATE SCHOOL

Some mechanical engineering graduates today go straight into a master's degree program and others pursue a master's degree later while in practice. This postgraduate study is widely supported by many employers. Significant and increasing numbers of those with master's degrees continue on to earn a doctorate degree, primarily to prepare for careers in research and teaching. Before selecting your technical electives, you may want to research the entrance requirements for a master's or doctoral degree.

In the master's degree program at Cal State L.A., you can specialize in dynamics and control, thermal-fluid systems, and materials science and mechanics. Typically, the minimum entrance GPA requirement for the master's degree program at Cal State L.A. is 3.0 for students with a Bachelor of Science in Mechanical Engineering.

STUDENT ORGANIZATIONS

Students are encouraged to seek out opportunities to participate in extra-curricular engineering clubs and organizations. These organizations provide students with various opportunities including applying their classroom knowledge to real-world engineering challenges, guest lectures by industry-leading engineers and scientists, site visits to local engineering companies, and outreach opportunities to the local schools and communities.

Honor Societies

Pi Tau Sigma and Tau Beta Pi are undergraduate honor societies. Election to honor societies represents outstanding scholarship as well as participation in other activities. Tau Beta Pi is for all engineering disciplines, while Pi Tau Sigma is for mechanical engineers only.

Professional Societies

The student chapters of professional societies conduct regular meetings, invite speakers, arrange field trips, and participate in local competitions. Our American Society of Mechanical Engineers (ASME) and Society of Automotive Engineers (SAE) Student Chapters have participated in contests in the past, such as human power vehicle design and remote-control aircraft design.

Student Organization	**Faculty Advisor**
Tau Beta Pi	Prof. Jeffrey Santner
Pi Tau Sigma	Prof. Sam Landsberger
American Society of Mechanical Engineers (ASME)	Prof. He Shen
Society of Automotive Engineers (SAE) Formula	Prof. Arman Pazouki
Society of Automotive Engineers (SAE) Baja	Prof. Chris Bachman
American Institute of Aeronautics and Astronautics (AIAA)	Prof. Chivey Wu
Biomedical Engineering Society (BMES)	Prof. David Raymond
Autonomous Underwater Vehicle (UAV)	Prof. He Shen
CubeSAT	Prof. Ni Li
MadScientists Club for Rehabilitation Engineering & Robotics	Prof. Sam Landsberger
Infinite Eagles Electric Vehicle Club	Prof. Sam Landsberger

PROFESSIONAL REGISTRATION

All mechanical engineers in charge of a project must be licensed or registered in the state or states in which the project will be conducted. To use the term "Professional Engineer" you must complete the requirements for professional registration or licensure established by the state. In California, registration requires education, work experience and the successful completion the Fundamentals of Engineering (FE), formerly Engineer in Training (EIT), examination and the Professional Engineering (PE) examination. The department offers a review course to help students prepare for the FE examination. Students are encouraged to register for the FE exam following their junior year.

II. UNDERGRADUATE DEGREE REQUIREMENTS

The mechanical engineering program provides instruction in the basic sciences and in engineering analysis and design. Areas of interest within mechanical engineering include: machine design, energy systems, robotics, aeronautics, materials, manufacturing, air-conditioning, and inter-disciplinary fields such as environmental engineering and biomedical engineering. The minimum requirements (122 semester units) for the Bachelor of Science degree in Mechanical Engineering are described in the following. Mechanical Engineering accredited by the Engineering Accreditation Commission of ABET, (http://www.abet.org). *All courses that serve as prerequisites to any mechanical engineering course must be completed with a minimum C grade*.

REQUIREMENTS FOR THE MAJOR (101 UNITS MINIMUM)

Lower Division Required Courses (50 units)

MATH 2110	Calculus I (4)
MATH 2120	Calculus II (4)
MATH 2130	Calculus III (3)
MATH 2150	Differential Equations (3)
MATH 2550	Introduction to Linear Algebra (3)
PHYS 2100	General Physics I (5)
PHYS 2200	General Physics II (5)
CHEM 1040	General Chemistry for Engineers (4)
ME 2030	Introduction to Mechanical Design (3)
CE/ME 2010	Statics (3)
ME 2040	Circuit Analysis for Mechanical Engineers (3)
CE/ME 2050	Strength of Materials I (3)
ME 2070	Materials Science & Engineering (3)
ME/CE 2800*	Numerical Methods for Engineers I (1)
ENGL 2030	Introduction to Technical Writing (3)

**May substitute a course in any high-level programming language with department approval.*

Upper Division Major Requirements (39 units)

ME/CE/EE 3000	Economics for Engineers (3)
ME/CE/EE 3010	Ethics and Professionalism in Engineering (3)
CE/ME 3030	Fluid Mechanics I (3)
ME 3040	Experimental Methods for Engineers (3)
CE/ME 3120	Strength of Materials Laboratory (1)
CE/ME 3130	Fluid Mechanics Laboratory I (1)
ME 3200	Dynamics (3)
ME 3210	Kinematics of Mechanisms (3)
ME 3230	Machine Design I (3)
ME 3260	Thermodynamics (3)
ME 3270	Manufacturing Processes (3)
ME 3800	Numerical Methods for Engineers II (2)
ME 4061	Heat Transfer I (3)
ME 4069	Thermal Systems Laboratory (1)
ME 4110	Vibrational Analysis (3)
ME 4310	Material Laboratory (1)

Senior Design Requirement (6 units)

The Senior Design requirement is a two-course series that must be completed sequentially. The first course (ME 4971) is offered during the Fall semester, while the second course (ME 4972) is offered in the Spring semester.

ME 4971	Mechanical Engineering Senior Project (3)
ME 4972	Mechanical Engineering Senior Project (3)

Upper Division Technical Electives (6 units)

Select two lecture courses in consultation with a faculty advisor.

ME 4020	Strength of Materials II (3)
ME 4030	Aerodynamics (3)
ME 4040	Propulsion Systems (3)
ME 4062	Heat Transfer II (3)
ME 4070	Heating, Ventilation and Air Conditioning Systems (3)
ME 4090	Mechanical Engineering Analysis (3)
ME 4120	Control of Mechanical Systems (3)
ME 4140	Machine Design II (3)
ME 4180	Energy Systems and Sustainability (3)
ME 4190	Computer-Aided Mechanical Engineering (3)
ME 4210	Dynamics of Mechanisms (3)
ME 4220	Optimization of Mechanical Engineering Systems (3)
ME 4230	Finite Element Analysis (3)
ME 4280	Automation and Computer-Aided Manufacturing (3)
ME 4300	Properties and Selection of Engineering Materials (3)
ME 4500	Biomechanics (3)
ME 4510	Biomaterials (3)
ME 4520	Impact Biomechanics (3)
ME 4540	Special Topics in Mechanical Engineering (1-3)
ME 4590	Rehabilitation Design & Internship (3)
ME 4810	Introduction to Robotics (3)
ME 4990	Undergraduate Directed Study (1-3)

LOWER DIVISION GENERAL EDUCATION REQUIREMENTS (21 UNITS)

Students must complete 39 units of lower division general education courses and 9 units of upper division general education courses. Mechanical engineering students receive 18 units of lower division and 9 units of upper division general education course credit through the mechanical engineering curriculum, as shown below. This leaves 21 units of lower division general education courses that mechanical engineering students must complete outside their major curriculum. These courses include:

Block A – Basic Subjects	
A1 - Oral Communication	COMM 1100 or HNRS 1100 (3)
A2 - Written Communication	ENGL 1005B or 1010 (3)
American Institutions	
U.S. History	1 course from approved list (3)
U.S. Constitution / Local Gov't	POLS 1000 (3)
Block C – Arts & Humanities	
C1- Arts	1 course from approved list (3)
Block D – Social Sciences	1 course from approved list (3)
Block E – Lifelong Understanding	ENGR 1500 (3) or met by a Block E course (3)

The following lower division general education courses are fulfilled within the mechanical engineering major:

A3 – Critical Thinking and Composition (3 units)

- Met within major by ME 2070 (3), ME 2010 (3), ME 2050 (3), ME 3030 (3), ME 3200 (3), ME 3261 (3), ME 4971 (3), ME 4972 (3)
- 2nd Composition – Met by ENGL 2030 (3)

B1 – Physical Science (3 units)

- Met by PHYS 2100 (5)

B2/3 – Biological Science (3 units)

- Met by ME 3040 (3) and CHEM 1040 (4)

B4 – Quantitative Reasoning & Mathematical Concepts (3 units)

- Met by MATH 2110 (4)

C2 – Humanities (3 units)

- Met by EE/ME/CE 3010 (3)

D – Social Sciences (6 units)

- Partially met by CE/EE/ME 3000 (3)

Minimum Average Grade

- A minimum C grade in A1, A2, A3, and B4 classes is required.
- A minimum *C grade average in general education* is required of all students.

UPPER DIVISION GENERAL EDUCATION REQUIREMENTS

Students are required to complete 9 units of upper division courses as part of the General Education program. These are fulfilled within the mechanical engineering major as follows:

Block B – Natural Sciences and Quantitative Reasoning (3 units)

- Met by ME 3060 (3)

Block C – Arts and Humanities (3 units)

- Met by ME 4971 (3) and ME 4972 (3)

Block D – Social Sciences (3 units)

- Met by ME 4971 (3) and ME 4972 (3)

UNIVERSITY REQUIREMENTS

Diversity Requirement

Students are required to complete two courses (6 units) certified as diversity courses (designated with (d) or (re)), at least one focusing on issues of race and ethnicity and their intersectionality with other social categories that structure inequality in society (designated with (re)). These courses can be completed either at the lower division or upper division level from among courses satisfying GE requirements.

Writing Intensive Requirement

The University Writing Intensive (wi) requirements (6 units) is met within the major through ME 4971 and ME 4972.

Civic Learning/Community Engagement Requirement

The University Civic Learning (cl) requirement is met by ENGR 1500 at the lower division level and ME 4971 and ME 4972 at the upper division level. Transfer students are exempt from the lower division (cl) requirement.

Introduction to Higher Education Requirement

The University Introduction to Higher Education (IHE) requirement is met by ENGR 1500. Transfer students are exempt from this requirement.

SAMPLE 4-YEAR STUDY PLAN

Bachelor of Science Degree in Mechanical Engineering

(Total: 122 Units)

YEAR	FALL		SPRING	
1	MATH 2110	(4)	MATH 2120	(4)
	ENGR 1500	(3)	PHYS 2100	(5)
	CHEM 1040	(4)	GE BLOCK A1	(3)
	GE BLOCK A2	(3)	ENGL 2030	(3)
	U.S. HISTORY	(3)		
		17		**15**

YEAR	FALL		SPRING	
2	MATH 2130	(3)	MATH 2150	(3)
	MATH 2550	(3)	ME 2040	(3)
	PHYS 2200	(5)	CE/ME 2050	(3)
	CE/ME 2010	(3)	CE/ME 2800	(1)
	ME 2030	(3)	ME 2070	(3)
			GE BLOCK C1	(3)
		17		**16**

YEAR	FALL		SPRING	
3	CE/EE/ME 3000	(3)	CE/EE/ME 3010	(3)
	ME 3040	(3)	ME 3130	(1)
	CE/ME 3120	(1)	ME 3210	(3)
	ME 3230	(3)	ME 3260	(3)
	ME 3200	(3)	ME 3800	(2)
	ME 3030	(3)	GE BLOCK D	(3)
		16		**15**

YEAR	FALL		SPRING	
4	ME 4971	(3)	ME 4972	(3)
	ME 4061	(3)	ME 4069	(1)
	ME 4110	(3)	ME ELEC. 1	(3)
	ME 4310	(1)	ME ELEC. 2	(3)
	ME 3270	(3)	U.S. CONST.	(3)
		13		**13**

SAMPLE 5-YEAR STUDY PLAN

Bachelor of Science Degree in Mechanical Engineering (Total: 131 Units, 122 Units required and 9 additional Units for additional coursework marked by *)

YEAR	FALL		SPRING	
1	MATH 1040*	(6)	MATH 2110	(4)
	ENGR 1500	(3)	CHEM 1040	(4)
	ENGL 1005A*	(3)	ENGL 1005B	(3)
			COMM 1100	(3)
		12		**14**

YEAR	FALL		SPRING	
2	MATH 2120	(4)	MATH 2130	(3)
	PHYS 2100	(5)	PHYS 2200	(5)
	ENGL 2030	(3)	CE/ME 2010	(3)
			ME 2030	(3)
		12		**14**

YEAR	FALL		SPRING	
3	MATH 2150	(3)	ME 2070	(3)
	ME 2040	(3)	CE/ME 2800	(1)
	CE/ME 2050	(3)	CE/ME 3030	(3)
	MATH 2550	(3)	ME 3040	(3)
	GE BLOCK C1	(3)	GE BLOCK D	(3)
			CE/ME 3120	(1)
		15		**14**

YEAR	FALL		SPRING	
4	CE/EE/ME 3000	(3)	CE/EE/ME 3010	(3)
	ME 3130	(1)	ME 4310	(1)
	ME 3230	(3)	ME 3210	(3)
	ME 3200	(3)	ME 3260	(3)
	ME 3800	(2)	U.S. HISTORY	(3)
		12		**13**

YEAR	FALL		SPRING	
5	ME 4971	(3)	ME 4972	(3)
	ME 4061	(3)	ME 4069	(1)
	ME 4110	(3)	ME ELEC. 1	(3)
	ME 3270	(3)	ME ELEC. 2	(3)
			U.S. CONST.	(3)
		12		**13**

These sample study plans assume that the student will attend only during the Fall and Spring semesters per academic year. However, the department offers a wide variety of courses during the summer term. Students may also take courses in summer term to accelerate their program of study.

SAMPLE 2-YEAR STUDY PLAN FOR TRANSFER STUDENTS

Bachelor of Science Degree in Mechanical Engineering

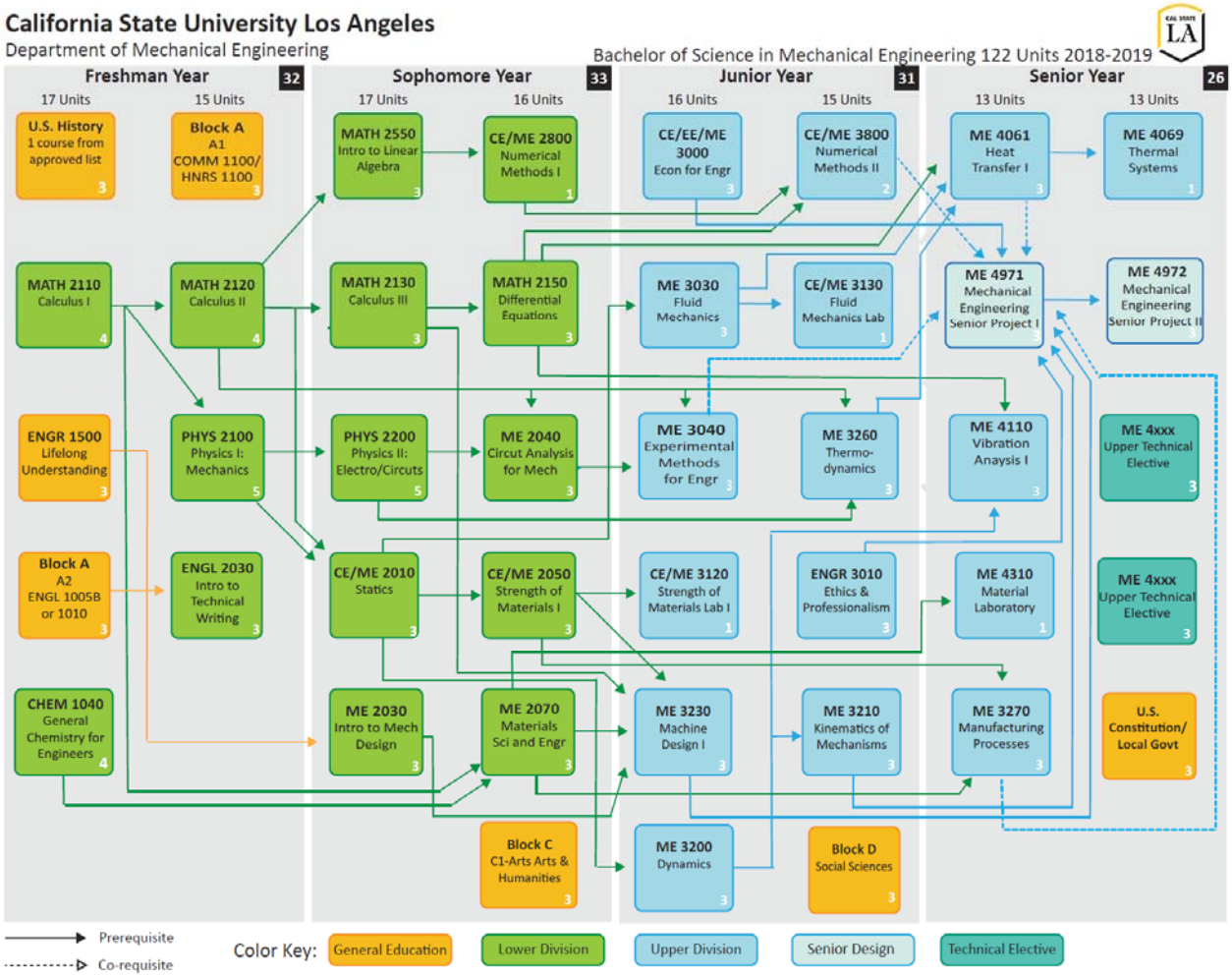
YEAR	FALL		SPRING	
1	ME 3030	(3)	CE/EE/ME 3010	(3)
	ME 3040	(3)	ME 3800	(2)
	ME 3230	(3)	ME 3130	(1)
	CE/ME 3120	(1)	ME 3210	(3)
	ME 3200	(3)	ME 3260	(3)
	CE/EE/ME 3000	(3)		
		16		**12**

YEAR	FALL		SPRING	
2	ME 4971	(3)	ME 4972	(3)
	ME 4061	(3)	ME 4069	(1)
	ME 4110	(3)	ME ELEC. 1	(3)
	ME 3270	(3)	ME ELEC. 2	(3)
	ME 4310	(1)	U.S. CONST.	(3)
		13		**13**

This sample 2-year study plan is suggested for students who transfer from another higher education institution or a community college with an equivalent of two years of transfer credits in General Education and the Major requirements (68 Units). It also assumes the student will attend only two semesters per academic year. However, the department offers a wide variety of courses during the summer term. Students may also take courses in the summer term to accelerate their program of study.

SAMPLE 4-YEAR FLOW CHART

Prerequisite structure of the BSME program



III. LIST OF COURSES

COURSES IN MECHANICAL ENGINEERING

ME 1140 – Machine Shop (1)
Introduction to machine shop procedures, safety practices, hand tools, band saw, drill press, milling, turning, welding. (Graded: CR/NC)

ME 1540 – Special Topics in Mechanical Engineering (1-3)
Current topics of special interest to students in mechanical engineering, as announced in Schedule of Classes. May be repeated for credit.
Prerequisites: Instructor consent and as needed for specific topic.

ME 2010 – Statics (3)
Prerequisites: MATH 2120, PHYS 2100 both with a minimum C grade. Fundamental principles of statics, resolution and composition of forces, algebraic and graphic solutions, friction, center of gravity, moment of inertia.

ME 2030 – Introduction to Mechanical Design (3)
Prerequisite: ENGR 1500 with a minimum C grade. Fundamentals of engineering design, use of computer-aided design (CAD) software, 2D drafting and 3D solid modeling, selected design projects, and operation of hand and machine tools. Lecture 2 hours. Laboratory 3 hours.

ME 2040 – Circuit Analysis for Mechanical Engineers (3)
Prerequisites: MATH 2120 and PHYS 2200 with a minimum C grade. Analysis of resistive circuits (nodal analysis, loop analysis, superposition, and power source conversion); operational amplifier; energy storage elements; first order and second order transient circuits.

ME 2050 – Strength of Materials I (3)
Prerequisites: CE/ME 2010 with a minimum C grade. Stresses and strains under axial, shearing, and torsional forces; flexural stresses and deflections of simple beams; columns; and combined stresses.

ME 2070 – Materials Science and Engineering (3)
Prerequisites: CHEM 1040, MATH 2110 both with a minimum C grade. Understanding structure and fundamental atomic and molecular mechanisms of engineering materials, atom and electron movement, physical and mechanical properties; overview of engineering materials, semiconductors, metals, ceramics, polymers, and composites.

ME 2800 – Numerical Methods for Engineers I (1)
Prerequisite: CE 2120 or MATH 2550. This course focuses on equipping students with the basic computing skills students will need throughout their engineering disciplines. Introduction to basic engineering problems, algorithm development, and implementation into a computer program. (Laboratory 3 hours)

ME 2801 – Introduction to Biomedical Engineering (3)
Corequisite: BIOL 2800. Introduction to the field of biomedical engineering. Covers fundamental knowledge on various subfields of biomedical engineering, including biomechanics, rehabilitation engineering, biomedical devices, biosignal processing, and responsible conduct in biomedical research.

ME 3000 – Economics for Engineers (3)
Basic economic concepts and principles, costs and benefits analysis, alternative designs, economic viability of engineering solutions in broader context.

ME 3010 – Ethics and Professionalism in Engineering (3)
Prerequisites: Junior or Senior standing in engineering. Ethical issues in engineering profession; impact of engineering profession on society; professional registration and liability; ethical standards and legal responsibilities.

ME 3030 – Fluid Mechanics I (3)
Prerequisites: PHYS 2100, CE/ME 2010 both with a minimum C grade. Fundamental principles and methods of fluid mechanics; thermodynamics of fluid flow; Newtonian fluids; equations of fluid flow; laminar and turbulent flow; applications.

ME 3040 – Experimental Methods for Engineers (3)
Prerequisites: ME 2040 or EE 2040, MATH 2120 both with a minimum C grade. Introduction to experimental methods, sensors and data acquisition with emphasis on mechanical applications in biomedical engineering. Statistical methods for the analysis of experimental data. Survey of transducers and measurement methods for a broad range of phenomena relevant to biomechanical engineering applications. Oral and written communication of experimental results and analyses. Lecture 2 hours. Laboratory 3 hours.

ME 3120 – Strength of Materials Laboratory I (1)
Prerequisite: CE/ME 2050 with a minimum C grade. Tests of engineering materials in tension, compression, bending, and torsion; verification by experiment of basic theories learned in strength of materials. Laboratory 3 hours.

ME 3130 – Fluid Mechanics Laboratory I (1)
Prerequisite: CE/ME 3030 with a minimum C grade. Experiments on fluid properties, fluid statics, conservation of mass, energy, and momentum, and fluid resistance. Laboratory 3 hours.

ME 3200 – Dynamics I (3)
Prerequisites: CE/ME 2010 with a minimum C grade. Kinematics and kinetics of rigid bodies; work, kinetic energy, impulse, momentum in two and three dimensions; applications to space mechanics.

ME 3210 – Kinematics of Mechanisms (3)
Prerequisites: ME 3200 with a minimum C grade. Transmission of motion; theory of mechanisms; linkages; gears; cams; belts and chains.

ME 3230 – Machine Design I (3)
Prerequisites: ME 2030, CE/ME 2050, ME 2070, and Math 2130 all with a minimum C grade. Application of principles of mechanics, properties of materials, and fabrication processes to design of simple machines and structural elements.

ME 3260 – Thermodynamics (3)
Prerequisites: MATH 2120 and PHYS 2200 both with a minimum C grade. Concepts of equilibrium and temperature; first and second laws of thermodynamics. Properties of pure substances; ideal gases; application of thermodynamic principles to closed and open systems.

ME 3270 – Manufacturing Processes (3)
Prerequisites: ME 2030, ME 2070, and ME 2050 all with a minimum C grade. Manufacturing properties of metals, alloys, and nonmetallic materials; solidification processes; material forming; material removal; joining processes; unconventional processing; numerical control; and automated processes.

ME 3800 – Numerical Methods for Engineers II (2)
Prerequisites: CE/ME 2800, MATH 2150 both with a minimum C grade. Applied Numerical Methods for Engineers with computer applications. Laboratory 6 hours.

ME 4020 – Strength of Materials II (3)
Prerequisites: ME 3230, MATH 2150 both with minimum C grade. Basic concepts; unsymmetrical beam bending, shear flow, energy methods; the finite element method; theories of failure; introduction to theory of elasticity, plane elastostatic problems; torsion of prismatic cylinders.

ME 4030 – Aerodynamics (3)
Prerequisites: MATH 2130, CE/ME 3030 both with a minimum C grade. Air-foil characteristics; transonic, supersonic, and viscous effects on lift and drag; power considerations, airplane performances, introduction to airplane and missile stability and control.

ME 4040 – Propulsion Systems (3)
Prerequisites: ME 3030 and ME 3260 both with minimum C grades. Introduction to the fluid thermodynamics of various types of aero-propulsion systems. Principles, design and applications of propellers, reciprocating engines, turbojet, turboprop and turbofan engines, rocket engines and electric propulsion systems.

ME 4061 – Heat Transfer I (3)
Prerequisites: MATH 2150, CE/ME 3030, and ME 3260; all with minimum C grades. Fundamental principles of heat transfer; conduction, convection, and radiation; applications.

ME 4062 – Heat Transfer II (3)
Prerequisites: ME 3030 and ME 4061 both with minimum C grades. Numerical methods in conduction; theory and applications of convection; thermal radiation, condensing and boiling heat transfer, mass transfer special topics.

ME 4069 – Thermal Systems Laboratory I (1)
Prerequisites: ME 4061 with minimum C grade. Experiments in heat transfer and thermodynamics; thermophysical properties of fluids; analysis, operation, and performance testing of thermal energy conversion systems. Laboratory 3 hours.

ME 4070 – Heating, Ventilation, and Air Conditioning Systems (3)
Prerequisites: ME 3030, ME 3260, and ME 4061 all with minimum C grades. Psychometry, heat loads, air conditioning and heating equipment, and air distribution. Design in engineering practice;

system simulation and optimization; economic, environmental, other constraints; practical aspects of equipment selection; thermal design literature.

ME 4090 – Mechanical Engineering Analysis (3)
Prerequisites: MATH 2150 with a minimum C grade, and senior standing. Setup of vibration, heat transfer, fluid flow, and other mechanical engineering systems as ordinary and partial differential equations; analogies between various physical systems. Classical, transform, numerical, and computer-aided methods of solution.

ME 4110 – Vibrational Analysis (3)
Prerequisites: CE/ME 3200 and MATH 2150, both with minimum C grades. Analysis of free and forced vibrations with and without damping, systems with several degrees of freedom, vibration isolation, mechanical transients, torsional vibrations, natural frequency computation techniques, finite element analysis software.

ME 4120 – Control of Mechanical Systems (3)
Prerequisites: ME 4110 and PHYS 2200 all with minimum C grades. Mathematical models of dynamic systems, fundamentals of feedback control, basic control actions and devices, applications to mechanical systems.

ME 4140 – Machine Design II (3)
Prerequisite: ME 3230 with a minimum C grade. Design of unit assemblies and machines; materials, safety, lubrication, and construction.

ME 4180 – Energy Systems and Sustainability (3)
Prerequisites: CHEM 1040 and ME 3260 both with minimum C grades. Existing and future energy-conversion systems with an emphasis on sustainability. Thermodynamics and transport processes applied to energy-conversion systems. Political, economic, and ethical complications associated with energy technologies. Systems using fossil fuels, nuclear, and renewable sources are discussed.

ME 4190 – Computer Aided Mechanical Engineering (3)
Prerequisites: ME 2800, ME 3030, ME 3230, and ME 4061 all with minimum C grades. Applications of modern engineering tools in computer-aided design, finite element analysis, computational fluid dynamics and control simulations. Problems in mechanics, heat transfer, fluid dynamics, and control, etc. are covered.

ME 4210 – Dynamics of Mechanisms (3)
Prerequisite: ME 3200 with a minimum C grade. Application of principles of statics, kinematics, and dynamics to analysis and design of mechanisms with rotating and reciprocating masses.

ME 4220 – Optimization of Mechanical Engineering Systems (3)
Prerequisites: MATH 2150, ME 4061, and PHYS 2200, all with minimum C grades. Design considerations of mechanical engineering systems; optimization techniques; application of existing computer programs and analytical methods to optimization of mechanical engineering systems.

ME 4230 – Finite Element Analysis (3)
Prerequisites: MATH 2550, ME 2800, and MATH 2150. Prerequisites or co-requisites: ME 3230 and ME 4061. All prerequisites with minimum C grades. Derivation of element stiffness matrices

for spring, bar, beam, and constant-strain triangle elements, from energy principles. Application of trusses and frames. Steady-state heat transfer. Use of finite element method software.

ME 4280 – Automation and Computer-Aided Manufacturing (3)
Prerequisite: ME 3270 with a minimum C grade. Automation of manufacturing processes, numerical control, computer-aided manufacturing, group technology, flexible manufacturing, applications of robots in industry.

ME 4300 – Properties and Selection of Engineering Materials (3)
Prerequisites: ME 2070 and ME 3270, both with minimum C grades. Production, strengthening, alloying and thermal treatment of metals. Types, properties of polymers, ceramics and composites. Semiconductor materials and devices. Material select and protection against deterioration.

ME 4310 – Material Laboratory (1)
Prerequisite: ME 2070 with a minimum C grade. Preparation of metallic samples and study of their internal structure by microscopic techniques. Mechanical testing of non-metallic materials: plastics, ceramics and composites.

ME 4500 – Biomechanics (3)
Prerequisites: ME 2050 and ME 3200, both with minimum C grades. Application of mechanical principles on living things, statics and dynamics of human activities, study of biomechanical mechanisms and structures, and mechanics of materials and tissues.

ME 4510 – Biomaterials (3)
Prerequisites: CHEM 1040, ME 2070, and ME 2050, all with minimum C grades. Description: Materials for biomedical applications, their chemical structures, physical and mechanical properties and processing, bio-reaction with biomaterials, bio-integration, implantation, inflammation, immune response, thrombosis, and calcification.

ME 4520 – Impact Biomechanics (3)
Prerequisites: ME 2050 and ME 3200, both with minimum C grades. Application of mechanical engineering principles to the study of biomechanical response of the body to impacts and human tissue tolerance. Use of engineering design principles in injury prevention.

ME 4540 – Special Topics in Mechanical Engineering (1-3)
Prerequisites: Senior standing in mechanical engineering; enrollment subject to approval of instructor in charge. Group study of selected topics not currently offered as technical electives; study groups may be organized in advanced mechanical engineering subjects upon approval of instructor. May be repeated for credit.

ME 4590 – Rehabilitation Design and Internship (3)
Prerequisite: ME 3200 with a minimum C grade. Corequisites: ME 3210 or ME 4201. Introduction to Rehabilitation and Biomedical Engineering utilizing cutting-edge analysis and measurement tools to apply students' skills to maximize independence and enhance activities of people with disabilities. This course requires Service-Learning.

ME 4810 – Introduction to Robotics (3)
Prerequisites: ME 2040 and ME 3200 with a minimum C grade. Introduction to robotic systems; robotic manipulators; spatial description; homogeneous transformations; manipulator kinematics; inverse manipulator kinematics; motion trajectories; static forces.

ME 4971 – Mechanical Engineering Senior Project (3)
Prerequisites: ME 3000, ME 3010, ME 3210, and ME 3230. Prerequisites or co-requisites: ME 3040, ME 3270, ME 3800, and ME 4061. All prerequisites with minimum C grades. Study of engineering design processes and case studies to discuss the impact of design constraints. Laboratory 6 hours.

ME 4972 – Mechanical Engineering Senior Project (3)
Prerequisites: ME 4971 with minimum C grade. Study of engineering design processes; develop a broader understanding of engineering solutions as well as professional ethics. ME 4972 includes the selection and completion of a faculty-supervised project resulting in a formal report and oral presentation. Laboratory 6 hours.

ME 4990 – Undergraduate Directed Study (1-3)
Prerequisite: Consent of an instructor to act as sponsor. Project selected in conference with the sponsor before registration; progress meetings held regularly, and a final report submitted. May be repeated for credit.

COURSES IN MATHEMATICS

MATH 2110 – Calculus I (4)
Prerequisites: MATH 1040 with a minimum C grade, or MATH 1081 and MATH 1083 both with a minimum C grade, or satisfactory score on placement examination; students with a grade of less than B- in either MATH 1040, or in one of MATH 1081 or MATH 1083 must enroll concurrently in MATH 2111. Functions, graphs, limits, continuity, derivatives, applications of the derivative, anti-differentiation, definite integral, Fundamental Theorem of Calculus, integration by substitution, applications of the integral.

MATH 2120 – Calculus II (4)
Prerequisites: MATH 2110 with a minimum C grade; students with a grade of less than B- in MATH 2110 must enroll concurrently in MATH 2121. Integration of transcendental functions, methods of integration, limits of sequences and series, power series, Taylor series, three dimensional analytic geometry.

MATH 2130 – Calculus III (3)
Prerequisites: MATH 2120 with a minimum C grade; students with a grade of less than B- in MATH 2120 must enroll concurrently in MATH 2131. Partial differentiation, multiple integration, vector calculus, line integrals.

MATH 2150 – Differential Equations (3)
Prerequisites: MATH 2120 with a minimum C grade; students with a grade of less than B- in MATH 2120 must enroll concurrently in MATH 2131. Partial differentiation, multiple integration, vector calculus, line integrals.

MATH 2550 – Introduction to Linear Algebra (3)
Prerequisite: MATH 2120. Vector spaces, linear transformations, linear equations, matrices, determinants, eigenvectors and eigenvalues, canonical forms.

COURSE IN CHEMISTRY

CHEM 1040 – General Chemistry for Engineers (4)
Prerequisites: Must be Engineering major and have a score of 50 or more on (or exemption from) ELM or MATH 0930 with a minimum C grade. Fundamental theory and applications of chemical principles. Atomic structure, chemical bonding, chemical reactions, reaction stoichiometry, thermochemistry, equilibrium, electrochemistry, classes and nomenclature of chemical compounds. Lecture 3 hours. Laboratory 3 hours.

COURSES IN PHYSICS

PHYS 2110 – General Physics I: Mechanics (5)
Prerequisites: MATH 2110 with a minimum C grade. Motion in one, two and three dimensions, Newton's laws of motion, circular motion, work and energy, energy transfer, linear and angular momentum and their conservation, universal gravitation, and periodic motion, Lecture 3 hours, lab 3 hours, tutorial workshop 2 hours.

PHYS 2200 – General Physics II: Electromagnetism and Circuits (5)
Prerequisite: PHYS 2100 with a minimum C grade. Elementary field theory, basic electricity and magnetism, electromagnetic induction, DC, RC, and RLC circuits, Maxwell's equations, and propagation of light. Lecture 3 hours, lab 3 hours, tutorial workshop 2 hours.

COURSES IN ENGINEERING

ENGR 1500 – Introduction to Engineering and Technology (3)
The course explores the engineering and technology profession. Introduction to design through hands-on projects affecting a local or regional issue. Academic success strategies. University structure, policies, procedures, and resources available. Lecture 2 hours; Laboratory 3 hours.

COURSES IN GENERAL EDUCATION

For description of courses in the General Education and Upper Division Theme requirements, refer to the University catalog, or the website at http://ecatalog.calstatela.edu.

Technical Electives Organized by Focus Areas

Material Science and Mechanics		Thermal-Fluid Systems Engineering	
ME 4020	Advanced Mechanics of Materials	ME 3262	Thermodynamics II
ME 4280	Automation and Computer-Aided Manufacturing	ME 4030	Aerodynamics
		ME 4040	Compressible Aerodynamics
ME 4300	Properties and Selection of Engineering Materials	ME 4060	Heat Transfer II
		ME 4070	Design of Thermal Systems
		ME 4080	Fluid Mechanics II
		ME 4150	Air Conditioning
		ME 4160	Energy Systems
		ME 4180	Renewable Energy and Sustainability
Biomechanical Engineering		**Dynamics and Control**	
ME 3801	Introduction to Biomedical Engineering	ME 4100	Control of Mechanical Systems Vibrational Analysis I
ME 4500	Biomechanics	ME 4110	Dynamics of Mechanisms
ME 4510	Biomaterials	ME 4210	Introduction to Robotics
ME 4520	Impact Biomechanics;	ME 4810	
ME 4590	Rehabilitation Design and Internship		
Interdisciplinary Topics			
ME 3980	Cooperative Education		
ME 4090	Mechanical Engineering Analysis		
ME 4190	Computer Aided Mechanical Engineering		
ME 4220	Optimization of Mechanical Engineering Systems		
ME 4230	Finite Element Analysis		
ME 4540	Special Topics in Mechanical Engineering		
ME 4990	Undergraduate Directed Study		

IV. GENERAL INFORMATION: PROCEDURES AND REGULATION

PRE-MAJOR AND MAJOR SPECIFIC CRITERION

Undergraduate students will be admitted into the Pre-Mechanical Engineering major until all major-specific courses have been completed. The major-specific courses must be completed within 60 units of coursework. The major-specific course requirements for the mechanical engineering program include:

MATH 2110	Calculus I (4)
MATH 2120	Calculus II (4)
PHYS 2100	General Physics I (5)
CHEM 1040	General Chemistry for Engineers (4)

All major-specific course criterion must be completed with a minimum C grade.

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 to 16 units.

CAMPUS IDENTIFICATION NUMBER (CIN)

California State University, Los Angeles will randomly assign a nine-digit Campus Identification Number (CIN) to all students in the University. This number is used as a means of identifying records and offering services pertaining to students. The students' Social Security Number will continue to be retained for purposes of financial aid eligibility and other debts payable to the institution.

ENROLLMENT

Enrollment begins with an **Enrollment Appointment**. Your appointment date and time is sent via email several weeks before the start of Registration; please refer to the Scheduling Office webpage in case you are unsure of the term's registration start date. *(You can find this date under the **Academic Calendar** tab under the appropriate term.)* If you cannot locate your email, you can also find your appointment date and time in the Student Center in the GET website.

You will be assigned a specific day and time when you may begin enrolling. **Enrollment Appointment** times are assigned randomly throughout the day based on your academic level and units earned. The time assigned to you is fixed and not subject to change for any reason. *Hint: In GET, use the **change term** button to select the correct term when looking for your **Enrollment Appointment**.*

One useful feature in GET is **Enrollment Validation**. Enrollment Validation is tied to your **Shopping Cart Appointment**; with Validation you can pre-screen your planned class schedule to identify classes that may require additional steps before you can successfully add them *(e.g. permit, consent, prerequisite, time conflict, etc.)*. With your schedule set, shopping cart validated, and permits in place, you can quickly finish enrolling when your **Enrollment Appointment** day and time arrive. *Note: validating your schedule does not reserve seats for you in the classes*.

Enrollment is a six step process. Refer to the University Registrar webpage for detailed step-by-step instructions (http://www.calstatela.edu/registrar/records-enrollment).

ACADEMIC ADVISEMENT

ECST Student Success Center Advising

The ECST Student Success Center (ESSC) provides an array of services to incoming freshman and sophomore students in all majors. Advisement is mandatory every semester for the first two years until the junior year. Students will receive an "Academic Advisement Hold" on GET every semester and will be able to register for the next semester only after they meet with an advisor. Students must make an appointment in advance to guarantee advisement time with a professional advisor or peer advisor. The appointments can be made by visiting the office or online through the link http://www.calstatela.edu/ecst/success/academic-advising and clicking on the "Student Success Collaborative" icon.

In addition to the one-to-one advising, ESSC also provides the following services to guide students on their pathway towards their degree:

1) *New Student Orientation*: working with the University New Student and Parent Program, ESSC organizes mandatory orientations for both incoming freshman and transfer students. During the Orientation, students not only learn how to navigate various University services, but also receive initial advising to register for their first semester. For Transfer Orientation, an important session is for the students to meet with their major faculty advisors to learn about major course requirements, get transfer credit evaluated for non-articulated courses, and develop an academic plan accordingly.
2) *Advising Sessions in ENGR1500*: To help first-year students understand the advising process and to aid in developing their academic planning skills, ESSC staff work with faculty to offer several advising sessions in ENGR1500 (Introduction to Engineering & Technology). These sessions provide students with information about University policies and procedures; information on probation and disqualification, a GPA calculation exercise; group advisement session; and developing an educational plan for subsequent semesters.
3) *First-year Learning Communities*: Working with Math, Physics and English departments, ESSC helps to create cohorts of ESCT students with block scheduling and encourage students to form study groups. These small learning communities help first-year students to gain a sense of belonging and more easily adapt to college life.
4) *Academic Excellence Workshops*: Each semester, ESSC will run a GPA query to identify students on probation or disqualification (freshman to senior students). The professional advisors will proactively reach out to these students and ask them to attend a mandatory workshop to develop action plans to improve their academic performance. In collaboration with the major departments, these Academic Excellence Workshops provide critical intervention for at risk students.

Department Undergraduate Advising

Advising is provided to each upper-division Mechanical Engineering student by full-time Mechanical Engineering faculty. All full-time faculty in the Department of Mechanical Engineering serve as advisors. Some advisors are designated as undergraduate advisors and others as graduate advisors. Advising hours are posted outside the department and faculty offices.

Students may meet the available advisor(s) based on their area of specialization or schedule constraints.

After meeting with their faculty advisor for the first time, students are urged to see their advisor each semester prior to registration. The purpose of these pre-registration meetings is to review the student's progress, to double check that the student is meeting the prerequisites, and to provide an opportunity for the student to discuss any questions he/she may have.

Mandatory group advisement occurs at both the junior and senior level for all Mechanical Engineering students. At the Junior level, several group advising sessions are hosted by the department chair and faculty advisors to 1) ensure students are aware of the requirements for the senior design sequence; 2) review with the students how to monitor their progress to degree; 3) provide general advice to help students be successful in their upper division major required and elective courses; 4) remind students about taking advantage of extracurricular activities including internships, team projects, and clubs; and 5) discuss career development and possible graduate study avenues.

The department also hosts graduation workshops for senior students. These workshops are conducted jointly by staff from the University Graduation Office, staff from the University Registrar's Office, the ME Department Chair/Associate Chair, and ME faculty advisors. At that workshop, students apply for graduation.

REPEATING COURSES

Unless otherwise indicated, students may not repeat for credit any course they have already completed with a grade of *C* (2.0 grade points) or higher nor may they, in any case, receive units earned more than once for each passing attempt. A maximum of two repeat attempts will be allowed for any course of C- or lower. *The second repeat will only be allowed for extenuating circumstances.* Repeating courses does not result in the removal of the original record and grade from the transcripts. Both grades are used for the calculation of the grade point average and remain on the student's record. A Grade Forgiveness Request form may be submitted to the registrar's office for up to 16 semester units of repeated coursework. This is limited to courses taken at Cal State LA, whether taken in a matriculated status or as coursework completed through the College of Professional and Global Education or Open University. Grade replacement shall occur only when the same or equivalent course is taken a second or third time at Cal State LA.

REMOVAL OF WORK FROM DEGREE CONSIDERATION

Under certain circumstances, up to two semesters of previous undergraduate course work taken at any college may be disregarded from all considerations associated with requirements for the baccalaureate. Detailed eligibility and procedural information may be found through the Registrar's Office. The basic criteria are listed below:

- Five years must have elapsed since the completion of the most recent work to be disregarded;
- Any previous removal of work from degree consideration must be included in applying the limits on work that may be disregarded;
- Since completion of the work to be disregarded, students must have maintained the following grade point averages at Cal State L.A. at the time of petition: 3.0 for students with 14–29 units completed; 2.5 with 30–44 units completed; and 2.0 with 45 or more units completed;

- There must be evidence that the student would find it necessary to complete additional units and enroll for one or more additional semesters to qualify for the baccalaureate if the request was not approved.

WITHDRAWAL FROM COURSES

Effective Fall 2009, all undergraduate students may withdraw from a maximum of 18 semester units over the course of their entire undergraduate career (including special sessions, enrollment by extension, and re-enrollment after separation from the University for any reason). Exceptions include courses taken prior to Fall 2009, courses dropped before the drop deadline, courses in which the student received a grade of WE (Withdrawal for Extenuating Circumstances), and courses taken at other institutions.

Prior to withdrawing from classes, the student should consider the consequences of withdrawal after the drop deadline. Withdrawing generally will impact progress towards degree, future course enrollment, financial aid eligibility and will be subject to the undergraduate withdrawal limit listed above. Be aware that after the drop deadline, class withdrawals are permissible only for serious and compelling reasons and, for undergraduate students, the class units will be applied towards the Undergraduate Withdrawal Limit of 18 units. The definition of serious and compelling reasons as applied by faculty and administrators will be defined more narrowly as the semester progresses.

Please be advised that poor academic performance or poor time management is not justification for withdrawing from classes. If the student has a documented serious medical condition that requires withdrawal from all classes, the student must complete the Withdrawal Petition and submit appropriate medical documentation or a statement from their physician confirming the student's illness or injury. If the petition is approved, the administrative grade of WE is assigned and the units assigned to the class will not be subject to the Undergraduate Withdrawal Limit. Students who have any questions regarding their decision to withdraw from a class should consult with their advisor as soon as possible.

Withdrawal After the Drop Deadline up until the 80% Point of the Term
(Winter and May Intersession and Summer Sessions, until last week of instruction)

Withdrawals during this period are subject to CSU's Undergraduate Withdrawal Limit and are permissible only for a serious and compelling reason. Class Withdrawals require approval from the instructor and department chair of the class. The definition of "serious and compelling reasons" as applied by faculty and administrators will be defined more narrowly as the semester progresses. Students must complete the Petition to Withdraw form and submit to the Records Office as soon as possible but no later than the established deadline for that term. If the petition is approved, a grade of W will be assigned and the class units will be applied toward the Undergraduate Withdrawal Limit.

Withdrawal During the Final 20% of the Term
(Winter and May Intersession and Summer Sessions, until last week of instruction)
Withdrawals shall not be permitted during the final 20% of instructional period except where the cause of withdrawal is due to circumstances clearly beyond the student's control (e.g. serious illness, accident, job transfer, military deployment, etc.) and the assignment of an incomplete is not practicable. Withdrawals of this sort may involve total withdrawal from the University or may involve only one course, except that course grade and credit or an incomplete may be assigned for courses in which sufficient work has been completed to permit an evaluation to be made. Requests

for permission to withdraw under these circumstances shall be handled and filed as indicated in the preceding paragraph, except that such requests must also be approved by the appropriate college dean. Such withdrawals shall not count against the 18 semester-unit maximum.

The department/division chair or school director may approve a withdrawal for a student without first obtaining the instructor's signature when the student and the chair and/or director have been unable to contact the instructor after a reasonable good faith effort. In these cases, the chair or director shall notify the instructor of the action and its justification.

Should the request not be approved, the student must initiate the incomplete process where applicable or complete the class. Students who do not follow the appropriate withdrawal procedure (cease attending class) may have a symbol of WU placed on their record for each class. The WU is treated as an F for GPA calculation.

COURSE PREREQUISITES AND COREQUISITES

Students are responsible for fulfilling prerequisites and corequisites. A prerequisite waiver must be approved for students taking Mechanical Engineering courses without the necessary prerequisite(s) and/or corequisite(s).

GRADES REQUIRED FOR CREDIT

The grade point average (GPA) is computed by dividing the total number of grade points earned by the total number of units attempted. No credit is received for courses where students receive a *F, W, or WU*.

GRADE POINT AVERAGE REQUIREMENTS

Undergraduate students are expected to maintain a minimum *C* (2.0) average in all courses attempted at Cal State L.A. and any other college or university attended and to make satisfactory progress toward their academic objectives. Students who receive financial aid should inform themselves of additional criteria defining satisfactory progress by consulting the Center for Student Financial Aid.

ACADEMIC PROBATION

Students are placed on academic probation if either their grade point average at Cal State LA or their cumulative grade point average in all college work attempted falls below a C (2.0). They are continued on probation for grade point deficiency until their entire deficiency is removed or until they are disqualified in accordance with the regulations stated below.

DISQUALIFICATION OF UNDERGRADUATE STUDENTS

Disqualification is determined separately for academic and administrative-academic deficiencies. Students' disqualification status is indicated on their grade report.

Academic Disqualification: Students currently on probation or special probation whose Cal State L.A. or cumulative grade point average reaches the following levels are disqualified:

Class Level	Grade Point Average
Freshman (0-29 units completed)	<1.50
Sophomores (30-59 units completed)	<1.70
Juniors (60-89 units completed)	<1.85

Seniors (90+ units completed) <1.95

Special Probation

Continuing students who are disqualified may petition to remain as matriculated students on special probation. To be eligible for special probation, disqualified students must complete the disqualification interview with their academic advisor and obtain the advisor's approval. The advisor must specify on the special probation petition the terms and conditions under which the student will be eligible to be returned to and to remain in matriculated status, such as courses to be repeated, courses to be completed, GPA requirements, and any required workshops and/or tutoring. All disqualified students who are reinstated or readmitted are placed on special probation because their GPA is below the value needed for the class level. These students must earn better than a C (2.0) GPA each term until the GPA is at least the minimum for the class level. Students will be disqualified when they completely withdraw while on special probation.

Disqualified students are required to arrange a disqualification interview with their academic advisor to review the reasons for disqualification, to explore the option of requesting special probation or readmission, and to establish the terms and conditions for recommending special probation or readmission. Undeclared majors will hold this interview with their advisor in the University Academic Advisement Center.

Reinstatement

Students who are denied/ineligible for special probation may petition for readmission. Readmission after disqualification is not automatic. Students must wait at least one term before applying for readmission. For readmission, students must satisfy the terms and conditions from the disqualification interview as documented in the student's file by the academic advisor. Students must also have a cumulative grade point average (GPA) that is at or above the minimum for their class level when they apply. (see above table for GPA requirements)

For greater detail on the reinstatement (readmission) process, please refer to the Faculty Handbook. Disqualified students must file their application for readmission before the appropriate admissions deadline.

Students enrolled but not officially reinstated for the term after disqualification should file a request for complete withdrawal and full refund of fees prior to the start of the term. Registration will be cancelled for disqualified students who are enrolled and do not file a withdrawal request. Fees are not returned in these cases.

RESIDENCE REQUIREMENT

Undergraduate students must complete a minimum of 30 semester units, including at least 24 upper division units, 12 units in the major, and 9 units in general education courses, in residence at Cal State L.A. for the baccalaureate. Credit earned in special sessions may be applied toward this residence requirement. However, only 24 residence units may be earned through Open University. Credit earned in extension courses or by examination may not apply toward the residence requirement.

SCHOLARSHIP REQUIREMENTS

In addition to meeting total unit requirements for graduation, students must also satisfy specific scholarship requirements. These include achievement of a minimum 2.0 grade point average (C on a scale in which A=4.0) in all units attempted, including those accepted by transfer from another institution, all courses required for the major, all courses used to meet General Education requirements, and all units attempted at Cal State L.A.

UNDERGRADUATE CREDIT FOR GRADUATE COURSES

Under special academic circumstances as specified below, an academic program, department, division or school, may approve the granting of baccalaureate credit for 5000-level course work to a maximum of two courses not to exceed a total of 6 semester units. Academic credits earned under this rule may not be used to satisfy requirements towards M.A. and M.S. degrees awarded by California State University, Los Angeles. Additionally, the following conditions must be met:

- Senior standing (completion of 90 semester units) at the start of the term in which the course will be taken;
- A grade point average adequate for admission in classified standing to the master's program in that major;
- Permission of the instructor teaching the course, the student's advisor, and the chair or director of the department, division or school offering the course.

GRADUATE CREDIT FOR UNDERGRADUATE STUDENTS

Undergraduate students with 90 semester units completed may take for graduate credit a maximum of 9 semester units in courses beyond the minimum requirements for the baccalaureate degree, provided they have maintained a grade point average of 2.75. Graduate credit is allowed for courses numbered in the 4000 and 5000 series only. Enrollment in any course for which graduate credit is requested must be approved in advance by the instructor teaching the course, the student's adviser and the coordinator/chair/director of the program/department/division/school offering the course. The approved application must be delivered to the Graduation Office, Administration 409, during the quarter before that in which courses are to be taken.

APPLICATION FOR GRADUATION (DEGREE CHECK)

Once a minimum of 90 semester units is earned, students may apply for graduation. Application for graduation (degree check) is made on a form available at the Cal State L.A. Graduation Office Website, academic department/division/school, the college advisement centers and at Enrollment Services in Administration 409. These forms are available five days prior to the application filing period. Candidates take their completed application form for payment to the Cashiers Office. Once payment is made, candidates take their application to their department, division or school for approval and processing. Filing periods are published in the Graduation Information section of the Schedule of Classes.

Students are arranged to meet with their faculty adviser who will complete the Bachelor's Degree Worksheet and approve the candidate's major program. The department, division or school will forward all documentation to the Graduation office for processing. The Graduation Office notifies students of the receipt of their graduation application and supporting documents.
Graduation check results are sent to the students in the mail prior to their final anticipated semester. Students who are enrolled in the semester they expect to graduate but do not complete all degree requirements will have their graduation application "automatically" transferred to the following semester for processing. Students who do not complete all requirements for the degree within the anticipated graduation date or the additional grace semester following the requested graduation date

must reapply for graduation. All questions regarding the graduation check or final results are to be directed to the student's major department, division or school.

Degrees dates are posted at the end of the semester in which all requirements are met.

V. FACULTY AND AREAS OF SPECIALIZATION

Nancy Warter-Perez, Chair of Mechanical Engineering, Professor of Electrical Engineering
Ph.D., University of Illinois
Computer Architecture, High-Performance Processor Design, Compiler Design, Embedded Systems, and Bioinformatics

John Christopher Bachman, Assistant Professor of Mechanical Engineering
Ph.D., Massachusetts Institute of Technology
Batteries, Fuel Cells, Supercapacitors, Electrochemistry, Sustainable Engineering, and Education

Mohsen Eshraghi, Assistant Professor of Mechanical Engineering
Ph.D., Mississippi State University
Materials Science, Manufacturing, Numerical Modeling, Lattice Boltzmann Method

Travis S. Hu, Assistant Professor of Mechanical Engineering
Ph.D., University of Akron
Nanomechanics and Nanomaterials of Engineering and Biological Systems, Interfacial Phenomena, Bioinspiration and Biomimetics, Multiscale Modeling and Simulation

Y. Jim Kuo, Assistant Professor of Mechanical Engineering
Ph.D., University of Toronto
Fluid Mechanics, Heat Transfer, Optimization, Renewable Energy, Sustainability

Samuel Landsberger, Professor of Mechanical Engineering and Kinesiology
Sc.D., Massachusetts Institute of Technology
Design, Kinematics, Rehabilitation Engineering

Ni Li, Assistant Professor of Mechanical Engineering
Ph.D., University of Central Florida
Dynamics and Kinematics, Optimization; Control, Instrument, and Sensor Design

Arturo Pacheco-Vega, Professor of Mechanical Engineering
Ph.D., University of Notre Dame
Fluid Mechanics, Heat Transfer, Dynamical Systems and Thermal Control, System optimization, Soft computing

Arman Pazouki, Assistant Professor of Mechanical Engineering
Ph.D., University of Wisconsin-Madison
Soil and Granular Media, Robotics, Computational Multibody Dynamics, Fluid-Solid Interaction, High Performance Computing

David E. Raymond, Associate Professor of Mechanical Engineering
Ph.D., Wayne State University
Impact Biomechanics, Vehicle and Sport Safety Systems, Forensic Engineering

Jeffrey Santner, Assistant Professor of Mechanical Engineering
Ph.D., Princeton University
Combustion Chemistry, and Flame Dynamics

Adel Sharif, Professor of Mechanical Engineering
Ph.D., University of California, Irvine
Registered Professional Mechanical Engineer
Machine Design, Structural Materials

He Shen, Assistant Professor of Mechanical Engineering
Ph.D., University of Central Florida
Dynamics and Control, Autonomous Systems, Process Automation, Modeling, Simulation, and Design

Chivey Wu, Professor of Mechanical Engineering
Ph.D., University of Illinois
Aerodynamics, Computer-Aided Engineering

Emeriti Professors:

Neda S. Fabris, Professor of Mechanical Engineering
Ph.D., Illinois Institute of Technology
Manufacturing, Material Science, Mechanics, and Design

Darrell W. Guillaume, Professor of Mechanical Engineering
Ph.D., University of California, Irvine
Registered Professional Mechanical Engineer
Fluid Mechanics, Thermodynamics, Heat Transfer, and Combustion

Lih-Min Hsia, Professor of Mechanical Engineering
Ph.D., University of California, Davis
Registered Professional Mechanical Engineer
Kinematics of Mechanisms, Computer-Aided Design, and Robotics

Stephen F. Felszeghy, Professor of Mechanical Engineering
Ph.D., University of California, Berkeley
Solid Mechanics, Finite Element Methods, Mechanical Vibrations, and Dynamics

Philip Gold, Professor of Mechanical Engineering
Ph.D., University of California, Los Angeles
Energy Systems, and Thermodynamics

Raymond B. Landis, Dean Emeritus
Ph.D., University of California, Los Angeles
Thermal Sciences and Fluid Mechanics

Ram Manvi, Professor of Mechanical Engineering
Ph.D., Washington State University
Registered Professional Mechanical Engineer
Energy Conversion, Thermal and Environmental Engineering

Michael, M. Maurer, Professor of Mechanical Engineering
Ph.D., Tulane University
Thermodynamics, Turbomachinery

Maj Dean Mirmirani, Professor of Mechanical Engineering
Ph.D., University of California, Berkeley
Dynamic Systems and Control, Applied Mechanics, Flight Mechanics

Richard D. Roberto, Professor of Mechanical Engineering
M.S., University of California, Los Angeles
Registered Professional Mechanical Engineer
Machine Design, Dynamics, Vibrations

MECHANICAL ENGINEERING FACULTY BASED ON FOCUS AREAS

Focus Area	Faculty
Materials Science and Mechanics	Mathias Brieu**, Mohsen Eshraghi, Travis Hu, Samuel Landsberger, Arman Pazouki, David Raymond, Adel Sharif
Thermal-Fluid System Engineering	John Christopher Bachman, Jim Kuo, Arturo Pacheco-Vega, Jeffrey Santner, Chivey Wu*
Dynamics and Control	Lih-Min Hsia, Ni Li, Arturo Pacheco-Vega, Arman Pazouki, He Shen
Biomechanical Engineering	Mathias Brieu**, Samuel Landsberger, David Raymond

* Dr. Chivey Wu retired effective June 2018.
** Dr. Mathias Brieu will join the department in January 2019.