جامعة الأمير محمد بن فهد الأهلية
PRINCE MOHAMMAD BIN FAHD UNIVERSITY

COLLEGE OF ENGINEERING

GENERAL CATALOG

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COLLEGE OVERVIEW

The College of Engineering accepts successful male students from PMU's Preparatory Program or other qualified male students into degree programs in engineering.

Within the College of Engineering, PMU's Department of Interior Design provides knowledge and appropriate training for women to be creative and innovative designers.

While students completing engineering degrees at PMU could certainly continue on to graduate studies, the main emphasis in the engineering programs is on the preparation of graduates for employment.

Vision and Mission

Vision

The College of Engineering at PMU offers a unique and distinguished education that prepares future leaders and innovators in the engineering disciplines of civil, electrical, mechanical engineering and interior design. The education process will explore innovative methodologies and technologies to achieve its objectives.

Mission

PMU's College of Engineering will educate tomorrow's engineering leaders and innovators, will create new knowledge, will provide a nurturing environment of team work and lifelong learning, and will positively impact the economic prosperity of the Kingdom of Saudi Arabia.

Degrees Offered

The College of Engineering offers the following degree programs:

- ***Bachelor of Science in Civil Engineering*** – Male & Female Students
- ***Bachelor of Science in Electrical Engineering*** – Male & Female Students
- ***Bachelor of Science in Mechanical Engineering*** – Male & Female Students

Mission Statement and Program Educational Objectives for Civil Engineering

Missions

- To prepare future leaders in the civil engineering areas that are equipped with strong professional skills and engineering backgrounds.
- To explore, enhance and expand the knowledge in the civil engineering areas by conduction innovative research and scholarly activity.
- To continue to the community and the profession through transfer of knowledge by providing innovative services and solutions.

Program Educational Objectives

- Graduates have successful and professional careers in civil engineering and related industries, and meet the expectations of the prospective employers
- Graduates demonstrate leadership and effectively undertake services within their profession and contribute to sustainable development with positive impacts in their communities
- Graduates pursue their professional development through continuous lifelong learning; advanced studies; and membership in professional societies

Mission Statement and Program Educational Objectives for Electrical Engineering

Missions

- To prepare its students to meet current and future needs of the national industry and government agencies, and to become productive professionals and leaders,

- To enhance and expand the knowledge in Electrical Engineering by conducting research and scholarly activity, and

- To reach out to the community and the profession through innovative services and solutions.

Program Educational Objectives

- Electrical engineering graduates will pursue successful careers as engineering professionals and/or undertake graduate studies.

- Electrical engineering graduates will pursue state-of-the-art solutions to engineering problems, and evaluate and embrace new technologies.

- Electrical engineering graduates will demonstrate professional and ethical responsibilities in their careers and engage in self-learning activities.

- Electrical engineering graduates will undertake leadership roles in industry and make positive impact in the development of their communities.

Mission Statement and Program Educational Objectives for Mechanical Engineering

Missions

The mission of the Department of Mechanical Engineering at PMU is to offer quality engineering education and impart essential skills to prepare its graduates to meet current and future needs of the industry and other private and public institutions, and to become productive professionals and leaders by reaching out to the community and the profession through innovative services and solutions.

Program Educational Objectives

Graduates of the program will meet the professional expectations of national and international employers of mechanical engineers.

Graduates of the program will undertake leadership roles in their communities and/or professions.

Graduates of the program will pursue advanced studies and/or professional certification/training, if they so desire.

Student Outcomes for Civil, Electrical, and Mechanical Engineering

1) An ability to identify, formulate, and solve complex engineering problem by applying principles of engineering, science, and mathematics
2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3) An ability to communicate effectively with a range of audiences
4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7) An ability to acquire and apply knowledge as needed, using appropriate learning strategies

ADMISSIONS PROCESS AND REQUIREMENTS

Admission to studies in the departments of Civil, Electrical, and Mechanical Engineering is open to male students who have completed the PMU Preparatory Program or who have met the university criteria for bypassing the program.
Admission to studies in the department of Interior Design is open to female students who have completed the PMU Preparatory Program or who have met the university criteria for bypassing the program.

Students seeking entry to degree studies in Interior Design may be requested to submit a design portfolio in place of the required essay. The portfolio should provide evidence of the student's existing interest in art or design. Such evidence might include drawings and a written statement designed to indicate the student's talent and desire to achieve success.

Required Courses in the Preparatory Program

The PMU Preparatory Program concentrates on English language, mathematics, and study skills. Within this program, the first semester math course, PRPM 0011: Introductory Algebra, is required of all students. However, during the second semester of mathematics, students have a choice of two tracks, depending on their desired major at the university.

Students seeking entrance to majors in Civil, Electrical, and Mechanical Engineering are required to take PRPM 0022: Pre-Calculus, during the second semester of the Preparatory Program.

Students seeking entrance to the Department of Interior Design should take PRPM 0012: Intermediate Algebra, during the second semester of the Preparatory Program.

PERFORMANCE EXPECTATIONS

Required Grade Average - Civil, Electrical, and Mechanical Engineering

The College of Engineering provides for minimum standards of academic performance from its students. Using a 4.0 scale for course grades, the College of Engineering will require that students maintain minimum grades of:

- 2.0 in courses from the PMU Core Curriculum
- 2.0 in all degree-specific courses (courses from the Core Curriculum that engineering students must take beyond the minimum requirement)
- 2.25 in all courses required in the College of Engineering that are common to all engineering majors
- 2.5 in all courses within the major academic discipline

All PMU engineering majors are required to pass an internationally-normed subject content exam.

A student who receives a D (1.0) or F in any course will be required to repeat the course and to achieve the required grade point score. In the case of an elective, another elective may be selected. These students will be required to participate in tutoring and remediation programs offered by the college faculty and the PMU Learning Resources Center.

Student Computing Requirements

Civil, Electrical, and Mechanical Engineering

Students within the College of Engineering are required to have personal laptop computers. They have access to the university-wide technology-infused environment including wireless Internet access.

Students in the college also have specific computing requirements that extend beyond the standard Microsoft Office applications of a typical laptop. Many of these specific computing requirements are available through the university's technology infrastructure to students' laptop computers. Others are provided through general access and specialized computer laboratories.

COMPONENTS OF DEGREE PROGRAMS

Each engineering degree program in PMU's College of Engineering consists of a 139 semester credit hours. The interior design program consists of 127 semester credit hours.

Majors in Civil, Electrical, and Mechanical Engineering

Each of the engineering degree programs offered within the College of Engineering consists of five components.

General Education Requirements: These requirements for the University Core Curriculum and College Core Curriculum include 60 credit hours of

courses in PMU core competencies, communications, Arabic Language and Islamic Studies, physical education, mathematics, laboratory science, and social and behavioral sciences. A detailed discussion of these requirements appears in the report Undergraduate Core Curriculum Design.

Additional Core Curriculum Requirements: These requirements include courses in mathematics and laboratory science in addition to the Core Curriculum requirements. These requirements add 12 credit hours beyond the 60 hour minimum for a total of 72 hours from the Core Curriculum.

Specifically, the University Core Curriculum requires six semester hours of mathematics. The engineering degree programs extend this requirement to 14 semester credit hours of mathematics, and specify that the courses are:

MATH 1422: Calculus I
MATH 1423: Calculus II
MATH 1324: Calculus III
MATH 2332: Differential Equations

University Core Curriculum requires eight semester hours of Natural and Physical Science. The engineering degree programs extend this requirement to 12 semester credit hours of Natural and Physical Science, and specify that the courses are:

CHEM 1421: Chemistry for Engineers I
PHYS 1421: Physics for Engineers I
PHYS 1422: Physics for Engineers II

College of Engineering Requirements: These requirements consist of seven courses totaling 19 credit hours that are common to all engineering degree programs in the College of Engineering. They represent a base of knowledge that is presumed for all engineers. The courses within the College of Engineering that meet these requirements are designated with the prefix GEEN. The GEEN courses include the following:

GEEN 1211: Introduction to Engineering
GEEN 2211: Engineering Computing
GEEN 2311: Engineering Mechanics I: Statics (only for Civil and ME Departments)
GEEN 2313: Thermodynamics I (only for Civil and ME Departments)
GEEN 3310: Applied Linear Algebra for Engineers (only for EE Department)
GEEN 3311: Introduction to Fluid Mechanics (only for Civil and ME Departments)
GEEN 3314: Electric Circuits and Electronics (only for ME Department)
GEEN 4311: Engineering Economy

Degree Program Requirements: Each degree program has unique course requirements that apply to the degree major and that also differentiate the program from other majors within the college.

Electives: Each degree program identifies the available electives and any constraints that will apply to the selection and scheduling of electives.

Of the total 139 hours required for a bachelor's degree in engineering, 91 credit hours are common to all three degrees.

Capstone Series – Civil, Electrical, and Mechanical Engineering

PMU's Core Curriculum includes a series of three required assessment courses. The series begins in the sophomore year with ASSE 2111: Learning Outcome Assessment I and continues in the junior year with ASSE 3211: Learning Outcome Assessment II. The series culminates in the senior year with a final capstone design course, ASSE 4311: Learning Outcome Assessment III.

The engineering programs in the College of Engineering treat the final capstone course as a group of three engineering courses that will integrate conceptual material and practical experience in an environment of professional-grade engineering design. For each of the majors, the engineering capstone course group is structured as follows:

Civil Engineering:

GEEN 4311: Engineering Economy
CVEN 4396: Civil Engineering Senior Design I
CVEN 4397: Civil Engineering Senior Design II

Electrical Engineering:

GEEN 4311: Engineering Economy
EEEN 4393: Electrical Engineering Senior Design I
EEEN 4394: Electrical engineering Senior Design II

Mechanical Engineering:

GEEN 4311: Engineering Economy

MEEN 4393: Machine Design
MEEN 4396: Mechanical Engineering Senior Design I
MEEN 4397: Mechanical Engineering Senior Design II

COURSES REQUIRED FOR MAJORS

Civil Engineering

The Bachelor of Science in Civil Engineering consists of four components totaling 139 credit hours:

Expanded PMU Core Curriculum: This expanded core curriculum consists of 72 hours of coursework.

The College of Engineering Requirements: These requirements consist of 19 hours of coursework contained in the seven courses designated with the GEEN prefix.

Degree Program Requirements: These requirements consist of 46 hours of course work in civil engineering as follows:

CVEN 2311: CAD for Civil Engineering
CVEN 3322: Materials in Civil Engineering
CVEN 3311: Structural Analysis
CVEN 3323: Engineering Geology
CVEN 3341: Engineering Measurement
CVEN 3331: Environmental Engineering Fundamental
CVEN 3332: Hydraulic Engineering
CVEN 3343: Engineering Probability & Statistics
CVEN 3344: Sustainable Engineering
CVEN 3301: Internship - Civil Engineering
CVEN 4313: Design of Steel Structures
CVEN 4323: Intro to Geotechnical Engineering
CVEN 4396: Civil Engineering Senior Design I
CVEN 4342: Transportation Engineering
CVEN 4314: Construction Management
CVEN 4397: Civil Engineering Senior Design II

Degree Electives: The Civil Engineering degree program requires three semester credit hours of electives to be taken from five 4000 level courses. These electives can be chosen from among the following four courses:

CVEN 4324: Foundation Analysis and Design
CVEN 4333: Water and Wastewater Treatment
CVEN 4334: Air Pollution and Control

Electrical Engineering

The Bachelor of Science in Electrical Engineering consists of four components totaling 139 credit hours:

Expanded PMU Core Curriculum: This expanded core curriculum consists of 72 hours of coursework.

The College of Engineering Requirements: These requirements consist of 19 hours of coursework contained in the seven courses designated with the GEEN prefix.

Degree Program Requirements: These requirements consist of 39 hours of course work in electrical engineering as follows:

GEEN 2310: Applied Linear Algebra for Engineers
ASSE 3211: Learning Outcome Assessment II
EEEN 3392: Advanced Applied Mathematics
EEEN 3361: Electromagnetic Fields and Waves
EEEN 3421: Electronics I
EEEN 3331: Digital Systems
EEEN 3422: Electronics II
EEEN 3432: Microcontroller Systems
EEEN 3341: Signals and Systems
EEEN 3461: Electric Machinery
EEEN 3391: Probability and Random Signal Analysis
EEEN 4440: Communication Systems
EEEN 4393: Electrical Engineering Senior Design I
EEEN 4423: Sensors and Instrumentation
EEEN 4394: Electrical Engineering Senior Design II
EEEN 4451: Automatic Control Systems
EEEN 4424: Power Electronics

Degree Electives: The Electrical Engineering Degree Program requires nine semester credit hours of electives to be taken from six 4000 level courses composed of two options, in Electrical Power Systems and in Telecommunications Systems.

The Electrical Power Systems Option consists of three courses:

EEEN 3461: Electric Machinery
EEEN 4371: Electric Power Systems
EEEN 4372: Electric Power Transmission and Distribution

The Telecommunications Systems Option consists of three courses:

EEEN 4341: Communication Systems
EEEN 4342: Digital Communication Systems
EEEN 4343: Wireless Communication Systems

Mechanical Engineering

The Bachelor of Science in Mechanical Engineering consists of four components totaling 139 credit hours:

Expanded PMU Core Curriculum: This expanded core curriculum consists of 72 hours of coursework.

The College of Engineering Requirements: These requirements consist of 19 hours of coursework contained in the seven courses designated with the GEEN prefix.

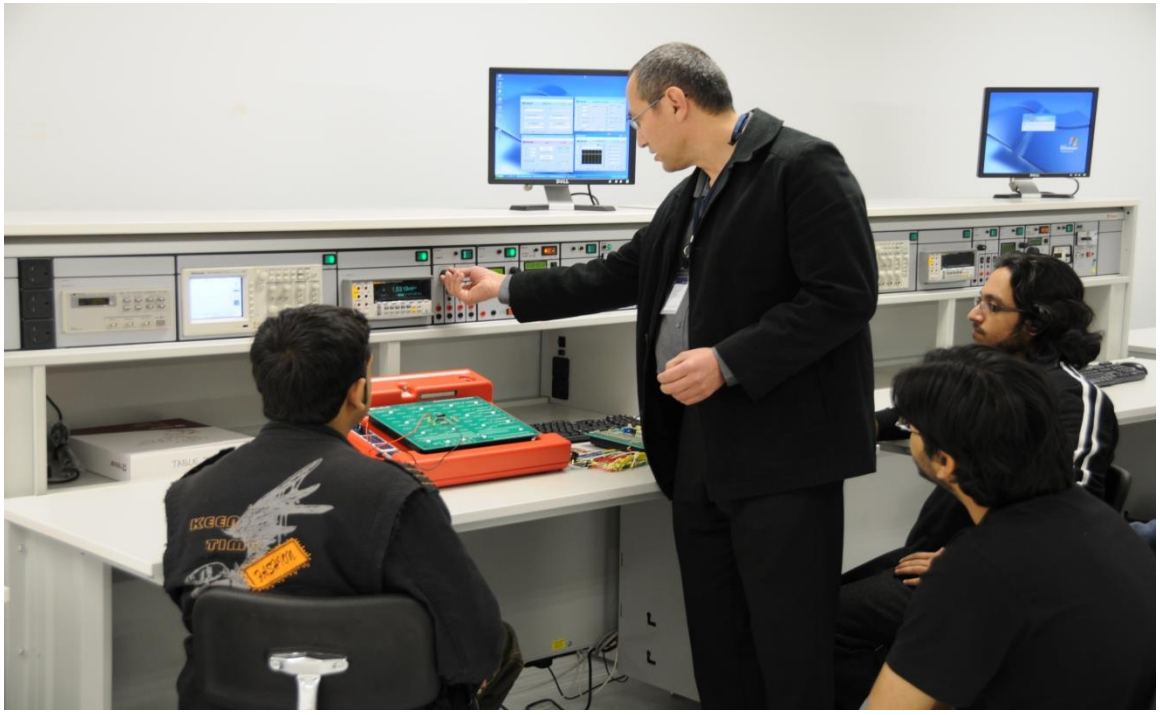
Degree Program Requirements: These requirements consist of 51 hours of course work in mechanical engineering as follows:

MEEN 2311: Materials Engineering
MEEN 2312: Engineering Mechanics II: Dynamics
MEEN 2313: Solid Mechanics
MEEN 3101: Machine Shop Practice & Safety
MEEN 3111: Thermofluids & Energy Lab
MEEN 3311: Manufacturing Processes
MEEN 3322: Thermodynamics II
MEEN 3333: Heat Transfer
MEEN 3391: Design of Mechanism
MEEN 3394: Computer Aided Design
MEEN 3395: Mechanical Vibration
MEEN 3432: Computational Methods
MEEN 4311: Principles of Heating, Ventilation and Air Conditioning
MEEN 4322: Power Generation

MEEN 4393: Feedback Control
MEEN 4393: Machine Design
MEEN 4396: Mechanical Engineering Design I
MEEN 4397: Mechanical Engineering Design II

Degree Electives: The Mechanical Engineering Degree Program requires six semester credit hours of electives to be selected from eight 4000 level courses within the department. The eight 4000 level courses are:

MEEN 4312: Fluid Mechanics
MEEN 4315: Principles of Building Energy Analysis
MEEN 4331: Internal Combustion Engines
MEEN 4332: Turbo-machinery
MEEN 4341: Corrosion Engineering
MEEN 4392: Advanced Control Systems
MEEN 4344: Materials in Design
MEEN 4351: Intermediate Dynamics
MEEN 4394: Advanced Control Systems



COURSE SEQUENCE FOR MAJORS

Civil Engineering

Total Semester Credit Hours: 139

Freshman Program

First Semester	*Hours*
ALIS 1211: Introduction to Islamic Culture	2
PHED 1111: Active Living Lifestyle	1
COMM 1311: Written Communication	3
UNIV 1211: Professional Development and Competencies	2
MATH 1422: Calculus I	4
PHYS 1421: Physics for Engineers I	4
GEEN 1211: Introduction to Engineering	2
Total Hours:	**18**

Second Semester	*Hours*
PHED 1112: Healthy Behaviors and Management	1
COMM 1312: Writing and Research	3
UNIV 1212: Critical Thinking & Problem Solving	2
MATH 1423: Calculus II	4
CHEM 1421: Chemistry for Engineers I	4
GEEN 2311: Engineering Mechanics I: Statics	3
Total Hours:	**17**

Sophomore Program

First Semester	*Hours*
COMM 2311: Oral Communication	3
UNIV 1213: Leadership and Teamwork	2
MATH 1324: Calculus III	3
PHYS 1422: Physics for Engineers II	4
GEEN 2211: Engineering Computing	2
ASSE 2111: Learning Outcome Assessment I	1
MEEN 2312: Engineering Mechanics II: Dynamics	3
Total Hours:	**18**

Second Semester	*Hours*
CVEN 2311: CAD for Civil Engineering	3
GEEN 2313: Thermodynamics I	3
MATH 2332: Ordinary Differential Equations	3
MEEN 2313: Solid Mechanics	3
COMM 2312: Technical & Professional Communication	3
ALIS 1212: The Social System in Islam	2
Total Hours:	**17**

Junior Program

First Semester	*Hours*
ASSE 3211: Learning Outcome Assessment II	2
GEEN 3311: Intro to Fluid Mechanics	3
CVEN 3322: Materials in Civil Engineering	3
CVEN 3311: Structural Analysis	3
CVEN 3323: Engineering Geology	3
CVEN 3341: Engineering Measurement	3
Total Hours:	**17**

Second Semester	*Hours*
CVEN 3331: Environmental Engineering Fundamental	3
CVEN 3332: Hydraulic Engineering	3
CVEN 3343: Engineering Probability & Statistics	3
CVEN 3312: Reinforced Concrete Design	3
CVEN 3344: Sustainable Engineering	3
ALIS 2211: Linguistic Communication Skills (Arabic)	2
Total Hours:	**17**

Senior Program

First Semester	*Hours*
CVEN 4313: Design of Steel Structures	3
CVEN 4323: Intro to Geotechnical Engineering	3
CVEN 4396: Civil Engineering Senior Design I	3
GEEN 4311: Engineering Economy	3
CVEN 4342: Transportation Engineering	3
CVEN XXXX: CE Tech. Elective I **	3
Total Hours:	**18**

***Select any Technical Electives Courses*

Second Semester	*Hours*
ALIS 2212: The Biography of Prophet Mohammad	2
CVEN 4314: Construction Management	3
CVEN 4397: Civil Engineering Senior Design II	3
CVEN XXXX: CE Tech. Elective II **	3
CVEN 3341: Social Science Elective*	3
Total Hours:	**14**

**Select any Social Science courses from the College Core Curriculum.*

*** Select any Technical Electives Courses*

Electrical Engineering

Total Semester Credit Hours: 139

Freshman Program

First Semester	*Hours*
ALIS 1211: Introduction to Islamic culture	2
COMM 1311: Written Communication	3
UNIV 1211: Professional Development and Competencies	2
MATH 1422: Calculus I	4
PHYS 1421: Physics for Engineers I	4
GEEN 1211: Intro to Engineering	2
Total Hours:	**17**

Second Semester	*Hours*
Social Science: Elective	3
PHED 1111: Active Living Lifestyle	1
COMM 1312: Writing and Research	3
UNIV 1212: Critical Thinking & Problem Solving	2
MATH 1423: Calculus II	4
PHYS 1422: Physics for Engineers II	4
Total Hours:	**17**

**Select any Social Science course from the College Core Curriculum*

Sophomore Program

First Semester	*Hours*
ASSE 2111: Learning Outcome Assessment I	1
COMM 2311: Oral Communication	3
EEEN 2411: Circuits I	4
MATH 1324: Calculus III	3
CHEM 1421: Chemistry for Engineers I	4
ALIS 1212: The Social System in Islam	2
Total Hours:	**17**

Second Semester	*Hours*
GEEN 2211: Engineering Computing	2
COMM 2312: Technical & Professional Communication	3
UNIV 1213: Leadership & Teamwork	2
GEEN 2310: Applied Linear Algebra for Engineers	3
MATH 2332: Ordinary Differential Equations	3
EEEN 2312: Circuits II	3
Total Hours:	**16**

Junior Program

First Semester	*Hours*
ASSE 3211: Learning Outcome Assessment II	2
EEEN 3392: Advanced Applied Mathematics	3

EEEN 3361: Electromagnetic Fields and Waves 3
EEEN 3421: Electronics I 4
EEEN 3331: Digital Systems 3
ALIS 2211: Linguistic Communication Skills (Arabic) 2
Total Hours: 17

Second Semester *Hours*

EEEN 3422: Electronics II 4
EEEN 3432: Microcontroller Systems 4
EEEN 3341: Signals and Systems 3
EEEN 3461: Electric Machinery 4
EEEN 3391: Probability and Random Signal Analysis 3
Total Hours: 18

Senior Program

First Semester *Hours*

EEEN 4440: Communication Systems 4
EEEN 4393: Electrical Engineering Senior Design I 3
EEEN 4423: Sensors and Instrumentation 4
EEEN 4XXX: Technical Elective I 3
GEEN 4311: Engineering Economy 3
Total Hours: 17

***Select all electives from one group:*

Group 1 - Electrical Power Systems: EEEN 3461: Electric Machinery, EEEN 4371: Electric Power Systems, and EEEN 4372: Electric Power Transmission and Distribution

Group II - Telecommunications Systems: EEEN 4341: Communication Systems, EEEN 4342: Digital Communication Systems, or EEEN 4343: Wireless Communication Systems

Second Semester *Hours*

EEEN 4394: Electrical Engineering Senior Design II 3
EEEN 4451: Automatic Control Systems 4
EEEN 4XXX: Technical Elective II 3
EEEN 4424: Power Electronics 4
PHED 1112: Healthy Behaviors and Management 1
ALIS 2212: The Biography of Prophet Mohammad 2
Total Hours: 17

***Select all electives from one group:*

Group 1 - Electrical Power Systems: EEEN 3461: Electric Machinery, EEEN 4371: Electric Power Systems, and EEEN 4372: Electric Power Transmission and Distribution

Group II - Telecommunications Systems: EEEN 4341: Communication Systems, EEEN 4342: Digital Communication Systems, or EEEN 4343: Wireless Communication Systems

Mechanical Engineering

Total Semester Credit Hours: 139

Freshman Program

First Semester	*Hours*
ALIS 1211: Arabic Language / Islamic Studies	2
PHED 1111: Active Living Style	1
COMM 1311: Written Communication	3
UNIV 1211: Professional Development and Competencies	2
MATH 1422: Calculus I	4
PHYS 1421: Physics for Engineers	4
GEEN 1211: Introduction to Engineering	2
Total Hours:	**18**

Second Semester	*Hours*
PHED 1112: Healthy Behaviors & Management	1
GEEN 2311: Engineering Mechanics I: Statics	3
COMM 1312: Writing and Research	3
UNIV 1212: Critical Thinking and Problem Solving	2
MATH 1423: Calculus II	4
CHEM 1421: Chemistry for Engineers I	4
Total Hours:	**17**

Sophomore Program

First Semester	*Hours*
ASSE 2111: Learning Outcome Assessment I	1
COMM 2311: Oral Communication	3
GEEN 2211: Engineering Computing	2
UNIV 1213: Leadership and Teamwork	2
MATH 1324: Calculus III	3
PHYS 1422: Physics for Engineers II	4
MEEN 2312: Engineering Mechanics II: Dynamics I	3
Total Hours:	**18**

Second Semester	*Hours*
ALIS 2212: Social System in Islam	2
COMM 2312: Technical and Professional Communications	3
GEEN 2313: Thermodynamics I	3
MEEN 2311: Materials Engineering	3
MATH 2332: Differential Equations	3
MEEN 2313: Solid Mechanics	3
Total Hours:	**17**

Junior Program

First Semester	*Hours*
GEEN 3314: Electric Circuits & Electronics	3

MEEN 3311: Manufacturing Processes 3
MEEN 3322: Thermodynamics II 3
GEEN 3311: Introduction to Fluid Mechanics 3
MEEN 3391: Design of Mechanism 3
ALIS 2211: Linguistic Communication Skills (Arabic) 2
MEEN 3101: Machine Shop Practice and Safety 1
Total Hours: 18

Second Semester *Hours*

MEEN 3394: Computer Aided Design 3
ASSE 3211: Learning Outcome Assessment II 2
MEEN 3432: Computational Methods 4
MEEN 3333: Heat Transfer 3
MEEN 3395: Mechanical Vibration 3
MEEN 3111: Thermofluids & Energy Lab 1
Total Hours: 16

Summer Semester *Hours*

MEEN 3301: Internship 3
Total Hours: 3

Senior Program

First Semester *Hours*

MEEN 4393: Machine Design 3
MEEN 4392: Feedback Control 3
GEEN 4311: Engineering Economy 3
MEEN 4322: Power Generation 3
MEEN 4396: Mechanical Engineering Senior Design I 3
MEEN XXXX: Elective *1 3
Total Hours: 18

Second Semester *Hours*

MEEN 4397: Mechanical Engineering Senior Design II 3
ALIS 2212: Biography of Prophet Mohammed (Arabic) 2
MEEN 4311: Principles of HVAC 3
MEEN XXXX: Elective*2 3
Social Science Elective 3
Total Hours: 14

Social Science Electives

Select from the following courses:

GEGR 1311 World Regional Geography, HIST 1311 World Civilizations, PSYC 1311 Intro to Psychology, SUST 1311 Intro to Sustainability, FREN 1311 Intro to French Language, SPAN 1311 Intro to Spanish language, ECON 1311 Intro to Macroeconomics, ECON 1312 Intro to Microeconomics

*Elective *1 & *2 MEEN XXXX*

Select from the following courses:

MEEN 4312 Fluid Mechanics *(Pre-req: GEEN 3311 Intro to Fluid Mechanics/MEEN 3322*

Thermodynamics II), **MEEN 4315 Principle of Building Energy Analysis** (Pre-req: MEEN 3322 Thermodynamics II/MEEN 3333 Heat Transfer), **MEEN 4331 Internal Combustion Engines** (Pre-req: MEEN 3322 Thermodynamics II/MEEN 3333 Heat Transfer), **MEEN 4332 Turbomachinery** (Pre-req: MEEN 3322 Thermodynamics II/MEEN 3333 Heat Transfer), **MEEN 4341 Corrosion** Engineering (Pre-req: MEEN 3322 Thermodynamics II/MEEN 3333 Heat Transfer/MEEN 2311 Materials Engineering), **MEEN 4344 Materials in Design** (Pre-req: MEEN 3311 Manufacturing Processes/MEEN 4393 Machine Design), **MEEN4351 Intermediate Dynamics** (Pre-req: MEEN 3395 Mechanical Vibrations), **MEEN 4394 Advanced Control System** (Pre-req: MEEN 4392 Feedback Control)

UNDERGRADUATE COURSES OFFERED BY THE COLLEGE OF ENGINEERING

Assessment – ASSE

Civil, Electrical and Mechanical Engineering

ASSE 4311: Learning Outcome Assessment III (3,0) The Capstone course in the PMU Civil, Electrical, and Mechanical Engineering programs requires students to complete a design project from project identification through problem statement, conceptual design, project analysis, final design, report preparation, and a final oral presentation. Student work in groups of three (ideally, one student from each major) and apply the knowledge they have acquired to demonstrate their mastery of the discipline through a well-executed project. **Prerequisite**: Academic standing as a second semester senior

Civil Engineering – CVEN

CVEN 2311: CAD for Civil Engineering (2,3) This course provides students with a broad introduction into 2-dimensional and 3-dimensional Computer-Aided Design (CAD) and modeling with a focus on construction- and civil-specific applications, including Building Information Modeling (BIM). Students will learn how to use industry-leading CAD software programs (Autodesk CAD, model construction projects, and then create and distribute basic, industry-standard Civil drawings. Understanding of the power and precision of computer-aided modeling and drafting; Ability to construct accurate 2D geometry as well as complex 3D shapes and surface objects; Ability to create 2D representations of 3D objects as plan view, elevations and sections; Ability to assemble these drawings in industry-standard plan form and produce plotted hardcopies ready for distribution; Awareness of architectural drafting with a focus on industry standards. **Prerequisite:** MATH 1324: Calculus III

CVEN 3311: Structural Analysis (3,0) This course is designed to develop students' ability to design and analyze basic civil engineering structure systems including beams, girders, trusses, and frames. The course introduces students to the various types of structural forms and loads, reaction forces, shear and bending moment diagram for statically determinate structure systems. Discussions on the analysis of statically indeterminate structures include the force method, the slope-deflection method, and the moment distribution method. An introduction to the analysis of structures using the stiffness method is made. Application of the stiffness method and matrix algebra to solve structural problems in beams, frames and trusses is addressed at the end of the course. **Prerequisite:** MEEN 2313: Solid Mechanics

CVEN 3312: Reinforced Concrete Design (3,0) This course introduces students to the theory of reinforced concrete and basic analysis techniques required in the codified design of civil engineering structural elements including beams, slabs, columns, and footings. The students learn the properties and materials of reinforced concrete, code and nomenclature used in current building code requirements, analyses and design of beams, shear and torsional strength in beams, bond and anchorage of reinforcement, crack and deflection of beams, and design of short and slender columns. **Prerequisite:** CVEN 3311: Structural Analysis

CVEN 3322: Materials in Civil Engineering (2,3) This course develops a good understanding of appropriate mechanical, physical, chemical and electro-chemical properties of civil engineering materials, including concrete and reinforced concrete, metals and alloys, polymeric materials, timber, asphalt, and advanced composite materials. The course is conducted in a combination of classroom presentations and discussions and hands-on material laboratory sessions. The weekly laboratory sessions complement lectures and provide hands-on experience with state-of-the-art mechanical tests on concrete, metals, polymers, fiber reinforced concrete, and wood. The subjects covered in this course are: terms and concepts in the field of materials engineering, materials structure and correlation with construction materials, corrosion and environmental degradation effects of materials, and common civil engineering materials including soils, aggregates, cements, asphalt and asphalt mixture, steel, alloys, plastics, wood and composite materials. **Prerequisite:** MEEN 2313: Solid Mechanics

CVEN 3323: Engineering Geology (3,0) This course is designed to provide students the understanding of the principles of geology with an emphasis on civil engineering applications. The course covers subjects such as rock geology, rock degradation, sediment erosion, hydrologic cycles, earthquake, slope stability, principles and problems in river and groundwater contamination. While general geology is the focus, emphasis is placed on Middle Eastern geology where appropriate. **Prerequisite:** GEEN 2313: Thermodynamics Dynamics I

CVEN 3331: Environmental Engineering Fundamentals (3,0) This course introduces students to the engineering aspects of environmental systems. It includes such topics

as mass balance, water quality management, water supply engineering, sources of atmospheric emissions, air pollution control and modeling, solid and hazardous waste management, environmental impact assessment, global climatic changes, and health risk assessment. **Prerequisite:** GEEN 3311: Intro to Fluid Mechanics

CVEN 3332: Hydraulic Engineering (2,3) This course is built on the principles and concepts of the prerequisite GEEN 3311: Introduction to Fluid Mechanics to provide students with the knowledge to address common hydrology and hydraulic engineering problems. Students develop a depth of understanding in hydrologic cycle, surface runoff, stream flow, groundwater, well hydraulic, flows in pipes and piping systems, open channel hydraulics, dams and reservoirs, hydraulic structures and machinery, and flood damage reduction. **Prerequisite:** GEEN 3311: Intro to Fluid Mechanics

CVEN 3341: Engineering Measurements (2,3) This course is designed to introduce students to the fundamentals and modern practices of surveying. The course is consisted of a series of lectures on the principles and methods for civil engineering measurements and a number of laboratory sessions on the field procedures of surveying. The course provides students with in-depth knowledge in horizontal measurement, vertical measurement, surveying instrumentation, differential leveling, directional measurement, horizontal control survey, mapping, and geographic information system. **Prerequisites:** CVEN 2311: CAD for Civil Engineering

CVEN 3343: Engineering Probability and Statistics (3,0) This is an introductory course in applied probability and statistics. The course is designed to provide students with probability concepts and problem solving skills that are useful for civil engineers. The course is conducted in a combination of classroom presentations/discussions (two hours per week) and hands-on computer simulation laboratory sessions (three hours per week). Subjects to be discussed in this course include data descriptions and summary, discrete and continuous random variable, discrete probability functions, continuous probability functions, conditional probability, sampling distribution of the mean, confidence interval, experimental designs, hypothesis testing, linear and multi-regression models. **Prerequisite:** MATH 1324: Calculus III

CVEN 3344: Sustainable Engineering (3,0) Good engineering solutions require consideration of ethical, environmental and sustainable issues. In this course students are introduced to various topics including: engineering ethics; sustainability, including design and manufacture; life cycle assessments; and environmental impact assessments. It also offers a comprehensive look at sustainable engineering design for buildings and infrastructure, taking into account the changes taking place in environmental operating conditions. **Prerequisite:** CVEN 3322: Materials in Civil Engineering

CVEN 4313: Design of Steel Structures (3,0) This course teaches students the design of structural steel members of frames, trusses, and other structures. It is a study of the design of structural steel, analysis and selection of structural steel members according to specifications. Emphasis is on understanding the basic behavior of structures. This course relates design specifications to structural behavior and shows students how specifications and codes are used in the solution of practical design problems. Topics include specifications, loads, methods of design, analysis and design of tension and compression members, design of beams and columns, bolt connections and rivets, welding and building connections, composite beams and columns, and design of steel buildings. **Prerequisites:** CVEN 3312: Reinforced Concrete Design, MEEN 2313: Solid Mechanics

CVEN 4314: Construction Management (3,0) This course is designed to familiarize students with concepts and methods employed in construction project management. Students learn the principles of project management, cost estimation, activities scheduling, cost and schedule control, contract administration, project progress measurement, and construction quality control. The course helps students develop skills in critical thinking, communication, teamwork, logical analysis, engineering ethics, and project management via assigned group projects. A strong emphasis is placed on learning how to effectively apply relevant computer software in construction project management. **Prerequisite:** GEEN 4311: Engineering Economy

CVEN 4323: Introduction to Geotechnical Engineering (2,3) This is an introductory course to geotechnical engineering. It provides students with knowledge in the stresses and strain of sand, shear strength of clay, critical state theory, soil bearing capacity for shallow foundations, and ultimate soil-bearing capacity for shallow foundations. Students also learn the effect of groundwater table, factor of safety, general bearing capacity equation, foundations subjected to one or two-way eccentricity, bearing capacity of foundations on slope, and bearing capacity of sand based on settlement. The course is conducted in a combination of classroom

presentations/discussions (three hours per week) and hands-on soil and geotechnical laboratory sessions (three hours per week). The weekly laboratory sessions complement lectures and provide hands-on experience with state-of-the-art mechanical tests on soil and foundations. **Prerequisites:** CVEN 3322: Materials in Civil Engineering, CVEN 3323: Engineering Geology

CVEN 4324: Foundation Analysis and Design (3,0) This course is built on students' previously accumulated knowledge in soil mechanics, engineering materials, and geotechnical engineering to understand the most important design aspects encountered in foundation engineering. The course includes critical review of the geotechnical properties of soil, lateral earth pressure, procedures for estimation of bearing capacity and shallow foundation, sheet piled walls, braced cuts, pile foundations, drilled-shaft foundations, foundations on difficult soils, and other aspects of geotechnical design. **Prerequisite:** CVEN 4323: Introduction to Geotechnical Engineering

CVEN 4333: Water and Wastewater Treatment (3,0) This course is built on the knowledge of hydraulic and environmental engineering students previously acquired to examine the various water issues and the causes and solutions to these problems. Students are expected to develop a solid understanding in the engineered treatment of water and wastewater. The course emphasizes on the application of scientific methods to problems associated with the development, movement, and treatment of water and wastewater. Students build necessary skills to apply engineering concepts and general knowledge in the area of civil and environmental engineering to the more complicated contemporary infra-structural civil engineering issues. This course discusses topics of water use, drinking water quality standards, water supply and use, water treatment systems, wastewater generation and sewer systems, design of sanitary sewers, wastewater treatment processes, principles of coagulation, flocculation, sedimentation, filtration, biological treatment, solids handling, disinfection, and other advanced wastewater treatment processes. The course is conducted in a combination of classroom presentations/discussions (three hours per week) and several field trips to local water and wastewater treatment facilities. The field trips complement lectures and provide hands-on experience with state-of-the-art water treatment operations. **Prerequisites:** CVEN 3331: Environmental Engineering Fundamentals, CVEN 3332: Hydraulic Engineering

CVEN 4334: Air Pollution and Control (3,0) This course introduces students to the sources and origins, fate and transport, health and environmental effects, abatement and control of air pollutants that have dramatically impacted the quality of human health and the environment since the industrial revolution in the 19th century. Students develop the basic concepts of air pollution effects on human health and the ecosystem health and understand the theories and practices in air pollution control. They understand the philosophy and standards for regulating air emissions. Students develop skills in the use of mathematical models and computer software for estimating the air pollution effects. Topics include sources and origins of air pollutants, air pollution effects, air quality standards, air pollution meteorology, pollutant fate and transport, control of airborne particulate matter, control of gaseous pollutants, atmospheric photochemical reactions, mobile sources, and global climate changes. Regulatory models currently available for estimating pollutant emissions and air concentrations is presented and discussed in the class. **Prerequisite**: CVEN 3331: Environmental Engineering Fundamentals

CVEN 4342: Transportation Engineering (3,0) This is an introductory course to transportation engineering. Students are expected to acquire a basic understanding of the methods and processes employed in design, planning, and management of transportation systems. The subjects to be discussed in the course include elementary considerations in transportation economics, interdependence of land use and transportation, vehicle and human characteristics, traffic flow characteristics, basic road design considerations, highway capacity design, intersection control and design, public and urban transportation, road safety and road safety audits, and travel-demand forecasting. **Prerequisite:** CVEN 3341: Engineering Measurements

CVEN 4396: Civil Engineering Senior Design I (2,3) Senior design project (SDP), also known as capstone design course, is a series of courses conducting in two semesters, SDP I and II. The course requires students to complete a project using the knowledge they have acquired from their undergraduate program. The students work in groups of three to four under the supervision of faculty member(s). Where appropriate, they also work with representatives of companies in the region to research and identify a problem to solve. Students identify tasks to be implemented and form their conceptual design. They shall raise questions and problems through group discussion and learn to clearly and precisely formulate answers. Students gather and assess relevant information, so that they can address the

project objectives. They learn how to think within alternative systems of thought and communicate effectively with others to arrive at solutions to the problems. At the end of the course, students complete a final project report and make an oral presentation. **Prerequisites:** CVEN 3301: Internship, CVEN 3312: Reinforced Concrete Design, Department approval

CVEN 4397: Civil Engineering Senior Design II (2,3) The course requires students to continue completing design project performed during Senior Design Project I (SDP I). The students are expected to retain group formation as was in the SDP I, and should there be new team arrangement it needs approval from respected advisor and/or course coordinator. In this course stage, students are encouraged to solicit professional engineers external to the department in the region to participate in the design development, i.e. discuss and to solve the design project. Students are expected to improve their design work and documentation, and they learn how to think within alternative systems of thought and communicate effectively with others to arrive at solutions to the problems. At the end of the course, students complete a final project report and make an oral presentation. **Prerequisites:** CVEN 4396: Senior Design Project I, GEEN 4311: Engineering Economy

Electrical Engineering – EEEN

EEEN 2411: Circuits I (3, 3) This course covers important theory in DC circuits analysis. Topics include a review of the solution of simultaneous equations; Kirchoff's Current and Voltage Laws; nodal and mesh circuit analysis; superposition; source transformations; Thevenin and Norton Equivalent circuits; ideal op-amps; and RC, RL, and RLC circuits. This course also has a laboratory component. Topics include basic bread-boarding techniques and circuit construction; use of multimeters, oscilloscopes, power supplies, and function generators; DC voltage and current measurement techniques; troubleshooting techniques; and comparison of experimental and simulated circuits. **Prerequisites:** MATH 1423: Calculus II, PHYS 1422: Physics for Engineers II

EEEN 2312: Circuits II (3, 3) Topics include a review of DC and AC circuit analysis techniques (covered in EEEN 2411: Circuits I).; complex numbers and phasors; use of phasors in the analysis of AC circuits; AC power concepts; polyphase circuits; magnetically coupled circuits; applications of Laplace and Fourier transforms in circuit analysis; s-domain circuit analysis; Bode plots; and filters. **Prerequisite:** EEEN 2411: Circuits I

EEEN 3331: Digital Systems - Also listed as COEN 3323: Digital Systems (2,3) This course presents students with knowledge and design applications in the field of Digital Systems. Students are led from the basics of Boolean algebra and logic gates through increasing understanding to the design of logic circuits. **Prerequisite:** EEEN 2411: Circuits I

EEEN 3341: Signals and Systems (3, 0) This course teaches the analysis and design of electrical circuits, devices, and systems. Students are introduced to types of signals, types of systems, the properties of systems, and convolution. Fourier series, transforms, and applications are covered. Laplace transforms and applications are covered. State variable techniques and z-transforms are taught. Problems are presented to help students identify real-life problems and formulate solutions using the skills developed in the course. **Prerequisites:** EEEN 2312: Circuits II, EEEN 3392: Advanced Applied Mathematics

EEEN 3361: Electromagnetic Fields and Waves (3, 0) This course constitutes an overview of the subject of electromagnetic fields: performing their analysis, acquiring and understanding of their underlying principles, and understanding the components of identifying and solving electric and magnetic field problems. The course progresses from identification to understanding through progressively modeling and simulating fields and waves as students learn to simulate and solve electromagnetic problems. **Prerequisite:** EEEN 2312: Circuits II

EEEN 3391: Probability and Random Signal Analysis (3, 0) In this course students acquire knowledge of the applied mathematics involved and develop skills in working with random signals and systems. Students are led from the basics of probability theory, random variables, and statistics through increasing understanding to the analysis of random signals and stochastic processes occurring in electrical engineering applications. **Prerequisites:** EEEN 2312: Circuits II, EEEN 3392: Advanced Applied Math

EEEN 3392: Advanced Applied Mathematics (3,0) In this course students acquire knowledge of the applied mathematics involved and develop skills in working with mathematical modeling and analysis of linear deterministic systems. Students are led from the basics of applied mathematics through increasing understanding to the modeling and analysis of linear

systems occurring in electrical engineering applications. **Prerequisites:** GEEN2310: Applied Linear Algebra for Engineers, MATH 2332: Differential Equations

EEEN 3421: Electronics I (3,3) This course is the first of two courses in the use of electronic devices in analog and digital circuits. The lecture component covers device physics and modeling of op-amps, diodes, FETs, and BJTs; single and multi-stage amplifiers; differential amplifiers; feedback; frequency response; Bode plots. Laboratory component covers generation and acquisition of signals; current, voltage, and impedance measurements; transfer function measurement; and spectrum measurements and analysis. **Prerequisite:** EEEN 2312: Circuits II

EEEN 3422: Electronics II (3,3) This course is the second of two courses in the use of electronic devices in analog and digital circuits. Lecture component covers analysis and design of operational amplifier circuits. D/A and A/D conversion. CMOS logic circuits, filters, oscillators and multivibrator circuits, power amplifiers, and pulse and switching circuits. Laboratory component covers the design and analysis of electronic circuits for digital and analog applications to a set of prescribed criteria. **Prerequisites:** EEEN 3421: Electronics I

EEEN 3432: Microcontroller Systems (3,3) In this course, students learn the components of microprocessor/microcontroller-based and learn to design and assemble microprocessor/microcontroller-based systems with applications to real-world engineering environments. Instruction covers microprocessor architecture and assembly language programming, hardware-software interactions, programming techniques, and control of real-time hardware. Students are led to consider the leadership role and societal responsibilities inherent in a professional, ethical, engineering approach to use of microprocessor systems. **Prerequisites:** EEEN 3331: Digital Systems, GEEN 2211: Engineering Computing

EEEN 3461: Electric Machinery (3,3) In this course, students learn the basic concepts about magnetic field and the reluctance of magnetic materials and air. The fundamentals of ac and dc machines and their detailed operating principles including transformers, induction machines, synchronous machines, and different types of dc machines are covered. Moreover, the voltage-current characteristics of generators and torque speed characteristics of motors are included. Various techniques for starting, speed control, reversing, and braking of AC and DC machines are considered to develop thorough understanding of construction, characteristics, operation, and proper application of ac machines being used in industries. **Prerequisite:** EEEN 3361: Electromagnetic Fields and Waves

EEEN 4342: Digital Communication Systems (3,0) This course constitutes an overview of the essentials of digital communications and practice in analyzing, problem solving, and designing systems with the use of computer simulation. Students are introduced to basic underlying theory and are led through increasing understanding for analysis and design skills necessary to the field. Probability and signal processing are utilized in problem solving. Digital modulation, error coding techniques, and system modeling are introduced. Computer simulation as a tool is emphasized. **Prerequisite:** EEEN 4440 Communication Systems

EEEN 4343: Wireless Communication Systems (3,0) This course presents an overview of wireless communications development, its practices, technologies, and current issues. Students design, study, and research the operation of wireless systems. System architecture, performance, modulation techniques, encoding, spread spectrum, coding and error control, networking and wireless LANS are studied. Prerequisite: **Prerequisite:** EEEN 4440: Communication Systems

EEEN 4371: Electric Power Systems (3,0) This course constitutes a comprehensive overview of electrical power systems. Fundamentals and underlying principles are addressed. Instruction includes topics which are encountered by practicing engineers. Real-world examples are presented for problem solving. The course also serves as preparation for further graduate study. Topics covered include basic concepts, modeling, power flow analysis, and fault analysis. **Prerequisite:** EEEN 4461: Electric Machinery

EEEN 4372: Electric Power Transmission and Distribution (3,0) Students develop knowledge and skills in the modeling, analysis, and design of electrical power systems incorporating overhead transmission and distribution lines, as well as underground distribution cables. Instruction, homework, and special analysis and design projects include recent power system issues. Electrical power distribution topics for low and medium voltage distribution systems include transformer connections and fault location calculations. Social, economic, environmental and ethical issues are also considered, including those issues related to high-voltage power transmission. **Prerequisite:** EEEN 4461: Electric Machinery

EEEN 4393: EE Senior Design I (3,0) In this course, students learn the importance of the design process in engineering. The design process is introduced and is taught through its components. Students make use of the design process to define and solve real-world engineering problems. Skills developed and used in the class include describing the design process for both product and system development, writing design specifications for problems, developing a project plan, applying concept generation, applying decision making tools, use of the Quality Function Deployment process, recognizing and discussing ethical issues, and developing an understanding of the role of professional codes and standards and their part in product safety, quality, and reliability. **Prerequisite:** EEEN 3432: Microcontroller Systems, EEEN 3301 Internship; Corequisites: EEEN 4440: Communication Systems, EEEN 4423: Sensors and Instrumentation

EEEN 4394: EE Senior Design II (3,0) The course requires students to complete a project using the knowledge they have acquired from their undergraduate program. The students work in groups of three under the supervision of a faculty member. Where appropriate, they also work with representatives of companies in the region to research and identify a problem to solve. Students identify tasks to be implemented and form their conceptual design. They shall raise questions and problems through group discussion and learn to clearly and precisely formulate answers. Students gather and assess relevant information, so that they can address the project objectives. They learn how to think within alternative systems of thought and communicate effectively with others to arrive at solutions to the problems. At the end of the course, students complete a final project report and make an oral presentation. **Prerequisite:** EEEN 4393 EE senior Design I

EEEN 4423: Sensors and Instrumentation (3,3) Lecture component covers electronic instrumentation systems, measurement errors and their minimization. Fundamentals of sensor technologies, their operation characteristics and applications such as temperature, light/radiation, pressure, humidity, strain and motion. Design of measurement systems including sensor selection and signal conditioning circuits. Measurement errors and calibration. The Lab component covers sensors characterization experiments, data acquisition, processing and analysis using NI Labview program. **Prerequisite:** EEEN 3422: Electronics II

EEEN 4424: Power Electronics (3,3) This course comprising lectures and lab experiments. The lecture component covers power electronics devices such as, diodes, transistors, and silicon controlled rectifier (SCR). Power electronics converters are also covered in detail as such as AC/DC, DC/AC and DC/DC converters in single and three phase circuits. Circuits' designs and simulation are involved in different aspects of the course. Laboratory component covers the conduct of experiments with converters and compare the results with theoretical concepts and simulations. **Prerequisite:** EEEN 3422: Electronics II

EEEN 4440: Communication Systems (3,3) This course constitutes and overview and practice in the field of telecommunications theory. Topics include an introduction, signals and signal space, analysis and transmission of signals, amplitude modulations and demodulations, angle modulation and demodulation, sampling and analog-to-digital conversion, principles of digital data transmission, introduction to information theory, and error correcting codes. **Prerequisites:** EEEN 3341: Signals and Systems, EEEN 3391: Probability and Ransom Signal Analysis

EEEN 4451: Automatic Control Systems (3,3) This course presents students with knowledge and design applications in the field of Automatic Control Systems. Students are introduced to automatic control and the components of analysis. The course advances to mathematical modeling of systems and consideration of applications in a global context. **Prerequisite:** EEEN 3341: Signals and Systems

Mechanical Engineering – MEEN

MEEN 2311: Materials Engineering (3,0) The course covers the various material structures, including chemical structure, microstructure, crystalline structure, interface structure, and phase diagrams. Bulk properties of metals, polymers, and ceramics are discussed with respect to the various structures. It also covers mechanical, electrical, optical, magnetic, and thermal properties of materials. **Prerequisites:** CHEM 1421: Chemistry for Engineers I, GEEN 2311: Engineering Mechanics I: Statics

MEEN 2312: Engineering Mechanics II: Dynamics (3,0) The course is the second course of engineering mechanics offered for all majors. This second course includes a thorough coverage of vectors, application of dot and cross products to engineering mechanics: dynamics problems. **Prerequisites:** MATH 1423: Calculus II, GEEN 2311: Engineering Mechanics I: Statics

MEEN 2313: Solid Mechanics (2,3) Topics covered in this course include concepts of stress, stress and strain-axial loading, torsion, bending, transverse loading, transformation of stress and strain, shear and bending moment diagrams, deflection of beams by integration method, deflection of beams by moment-area method, and column. **Prerequisites:** GEEN 2311 Engineering Mechanics I: Statics, MATH 1324: Calculus III

MEEN 3111: Thermofluids & Energy Lab (0,3) This course is an introduction to experimental methods in the thermal sciences. Students learn to analyze raw data and organize the results into a comprehensive lab report. They also are exposed to experiments and techniques in the various areas of thermal science. Students are expected to have a thorough understanding of fluid mechanics and thermodynamics, with heat transfer to be successful in this course. **Prerequisite:** MEEN 3333: Heat Transfer

MEEN 3101: Machine shop Practice & Safety (0,3) This course is an introduction to experimental methods in the Manufacturing sciences. Students learn to analyze raw data and organize the results into a comprehensive lab report. They also are exposed to experiments and techniques in the various types of manufacturing processes. Students are expected to have a thorough understanding of manufacturing and materials to be successful in this course. **Prerequisite:** MEEN 3311: Manufacturing Processes

MEEN 3311: Manufacturing Processes (3,0) This course introduces modern manufacturing processes including computer application (CAD/CAM) in manufacturing. It provides a special emphasis on materials selection for various design and manufacturing applications. Students are familiarized with solidification processes, particulate and plastic manufacturing processes, micro manufacturing, rapid prototyping, non-traditional material removal processes, composite manufacturing, and joining processes. Design for manufacturability, design-for-assembly, design-of-experiment, and Design for Cost are also discussed. **Prerequisite:** MEEN 22311: Materials Engineering

MEEN 3322: Thermodynamics II (3,0) This course continues the introduction to concepts of thermodynamics begun in GEEN 2313, Thermodynamics I. Various thermodynamic cycles and systems are covered, which include gas and vapor power cycles, propulsion, and refrigeration cycles and systems. The emphasis is on the calculation of the thermal performance and the approaches to improve. The basics of HVAC are introduced through concepts of properties of gas mixtures and psychrometry. Heating and cooling loads under a set of conditions are determined. Thermodynamics of the system with chemical reaction is also covered, which includes the air-fuel ratio, adiabatic flame temperature, and heat release from the reacting flow. **Prerequisite:** Successful completion of: GEEN 2313: Thermodynamics I, Concurrent registration in: GEEN 3311: Introduction to Fluid Mechanics

MEEN 3432: Computational Methods (3,3) This course presents numerical methods to solve problems related to Mechanical Engineering fields. These include Taylor series and error analysis, numerical integration and differentiation, non-linear algebraic equations; curve fitting and regression, boundary value problems; and ordinary differential equations. Students learn which techniques to apply to different systems – both what works, and what does not work. The students learn to solve mathematical equations using both numerical and analytical tools. **Prerequisites:** GEEN 2211: Engineering Computing, MATH 2332: Differential Equations

MEEN 3333: Heat Transfer (3,0) Topics covered in this course include introduction to heat transfer; conservation of energy requirement; Fourier law; conduction rate equation, boundary and initial conditions; one-dimensional steady state conduction; thermal resistance and thermal circuit; plane wall and radial systems; heat transfer from extended surfaces; introduction to convection; velocity and thermal boundary layers; dimensionless parameters; external flow; internal flow, combined internal and external flow; free convection; introduction to radiation heat transfer, heat exchanger design. **Prerequisite:** GEEN 3311: Introduction to Fluid Mechanics

MEEN 3391: Design of Mechanisms (3,0) This introduction to engineering design and the design concept provides an understanding of the kinematics of machine elements, including linkages, rolling and sliding contacts, cams, and gears and gear trains. Both static and dynamic force analyses in mechanisms are introduced. Students are expected to have a thorough understanding of calculus, physics, and statics and dynamics to be successful in this course. Mechanical engineering majors take this course in the first semester of the junior year. **Prerequisite:** MEEN 2312: Engineering Mechanics II: Dynamics

MEEN 3394: Computer Aided Design (2,3) This course is an introduction to computer aided design. Students are

introduced to the basics of mechanical design using computers. The foundation of the course is based on introductory level computational mechanics. In addition, students will utilize commercially available CAD packages (preferably Solidworks) to design mechanical components and assemblies. The use of CAD to optimize designs and to create bill of materials and kinematic studies is introduced. Mold design and sheet-metal applications are also introduced. The course will introduce use of computer aided designs to generate rapid prototypes and how to interface with computer aided manufacturing. Mechanical engineering majors take this course in the second semester of the junior year. **Prerequisites:** MEEN 3311: Manufacturing Processes, MEEN 3391: Design of Mechanisms

MEEN 3395: Mechanical Vibrations (2,3) This course capitalizes on students' acquired knowledge to provide them with vital skills as mechanical engineers. The course starts by introducing students to the basic vibratory system, viz., single degree of freedom system (SDOF): equation of motion formulation and solving for both linear and torsional systems. Free and forced vibration concepts are introduced at this level as well as the concept of damping and the natural frequency and resonance. This is further extended to the two degrees of freedom system (2DOF), where the vibration control (vibration absorber) is introduced. Multiple degrees of freedom systems (MDOF) are introduced and the concept of lumped parameter modeling (LPM) is explained (both linear and torsional). Matrix formulation and the MATLAB/Simulink differential equation solving capabilities are presented to the students to solve for the steady state vibrations of the system. Continuous systems are next introduced and the vibrations of beams and bars are discussed. Finally, the concepts of modal analysis and the measurements of vibrations are presented and illustrated by the aid of lab experiments and finite element simulations. **Prerequisite:** MEEN 3391: Design of Mechanisms

MEEN 4392: Feedback Control (2,3) The concepts of dynamics and control of mechanical systems are presented. The students learns to solve control problems for both steady-state and transient responses. Control design featuring both time and frequency response is covered. Several classes of controllers are covered. Students are expected to have a thorough understanding of mathematics and statics and dynamics to be successful in this course. Mechanical engineering students take this course in the second semester of the junior year. **Prerequisites:** MEEN 3432: Computational Methods, MEEN 3395: Mechanical Vibrations

MEEN 4393: Machine Design (3,0) This course presents the concepts of mechanical design from the point of view of stress analysis. Machine components are designed based on a reliability and failure analysis. Various types of mechanisms are discussed. Students are expected to have a thorough understanding of mathematics, statics and dynamics, mechanics of solids, and mechanisms to be successful in this course. Mechanical engineering students take this course in the first semester of the senior year. **Prerequisite:** MEEN 3394: Computer Aided Design

MEEN 4311: Principles of Heating, Ventilating, and Air Conditioning (HVAC) (2,3) The subject matter of this course includes an overview of various HVAC systems with an emphasis on cooling applications. Comfort conditions, psychometrics, HVAC components, equipment sizing and selection, cycle efficiencies, and duct and piping layouts are analyzed and designed. **Prerequisites:** MEEN 3322: Thermodynamics II, MEEN 3333: Heat Transfer

MEEN 4322: Power Generation (3,3) Starting with an overview of issues related to energy and power generation, the course covers the various systems and cycles used in producing electrical power. The main emphasis is on traditional steam-generation plants, gas turbines, and combined cycle plants burning natural gas or oil. The energy conversion processes and energy efficiency are presented, and the operation of key components (fan, pump, condenser and cooling tower) is covered. The basics of plant emission and controls are included in the course. To complete the picture of power generation, a brief introduction to power generation with renewable energy is given. **Prerequisites:** GEEN 3311: Introduction to Fluid Mechanics, MEEN 3322: Thermodynamics II, MEEN 3333: Heat Transfer

MEEN 4396: Mechanical Engineering Senior Design I (2,2) The course requires students to complete a project using the knowledge they have acquired from their undergraduate program. The students work in groups of three under the supervision of a faculty member. Where appropriate, they also work with representatives of companies in the region to research and identify a problem to solve. Students identify tasks to be implemented and form their conceptual design. They shall raise questions and problems through group discussion and learn to clearly and precisely formulate answers. Students gather and assess relevant information, so that they can address the project objectives. They learn how to think within alternative

systems of thought and communicate effectively with others to arrive at solutions to the problems. At the end of the course, students complete a final project report and make an oral presentation. **Prerequisites:** MEEN 3394 Computer Aided Design and Department approval

MEEN 4397: Mechanical Engineering Senior Design II (2,2) The course requires students to complete a project using the knowledge they have acquired from their undergraduate program. The students work in groups of three under the supervision of a faculty member. Where appropriate, they also work with representatives of companies in the region to research and identify a problem to solve. Students identify tasks to be implemented and form their conceptual design. They shall raise questions and problems through group discussion and learn to clearly and precisely formulate answers. Students gather and assess relevant information, so that they can address the project objectives. They learn how to think within alternative systems of thought and communicate effectively with others to arrive at solutions to the problems. At the end of the course, students complete a final project report and make an oral presentation. **Prerequisite:** MEEN 4396: Mechanical Engineering Senior Design I

MEEN 4312: Fluid Mechanics (3,0) In this course, students learn to solve problems related to piping systems in series and/or in parallel. The concept of a boundary layer is introduced, together with the pressure and shear stress along the surface of immersed bodies. Students learn how to calculate lift and drag acting on a body due to a flowing fluid. The fundamental principles of flow through pumps, fans, turbines, and compressors will be studied with a focus on fluid and thermal analysis on these machines. In addition, the compressible flow is examined. The concepts of compressibility, speed of sound, and Mach number are introduced. The topics covered in compressible flow also include both isentropic and nonisentropic flows of an ideal gas with constant and various flow cross-sectional areas. The basics of computational fluid dynamics (CFD) are also included in this course. **Prerequisites:** GEEN 3311: Introduction to Fluid Mechanics, MEEN 3322: Thermodynamics II

MEEN 4315: Principles of Building Energy Analysis (3,0) The course is to analyze the building energy usage by applying the current ASHRAE building load calculation methods. Both the heat balance (HB) and radiant time series (RTS) methods are introduced to calculate building loads. Solar radiation, heat release from occupants, and heat transfer from the building to the ambient under various weather conditions are considered. The concepts from thermodynamics, heat transfer, and mathematics courses are practiced in this course. Different from the HVAC course, the emphasis of this course is on thermal load analysis for different building structures and designs. MEEN 4311, Principles of HVAC and this course can be taken in any order. **Prerequisites:** MEEN 3322: Thermodynamics II, MEEN 3333: Heat Transfer

MEEN 4331: Internal Combustion Engines (3,0) In this course, students learn to solve problems involving the fluid mechanics, thermodynamics, and heat transfer of the internal combustion engine. Students are expected to have a thorough understanding of thermodynamics, fluid mechanics, heat transfer, and chemistry to be successful in this course. **Prerequisites:** MEEN 3311: Intro to Fluid Mechanics, MEEN 3322: Thermodynamics II, MEEN 3333: Heat Transfer

MEEN 4332: Turbomachinery (3,0) This course introduces students to various turbomachines, including pumps, fans, compressors and turbines. The performance of turbomachinery is analyzed through the application of fluid mechanics and thermodynamics. The similarity and scaling laws are developed to calculate the overall energy transfer rate and power input or output. The basics of blade design are covered through 2D cascades, and more detailed design principles of radial and axial flow machines are also presented. The relationship between the blade design and the performance is explored. **Prerequisites:** GEEN 3311: Introduction to Fluid Mechanics, MEEN 3322: Thermodynamics II, MEEN 3333: Heat Transfer (Co-requisite)

MEEN 4341: Corrosion Engineering (3,0) Topics covered in this course include the technology and evaluation of corrosion; electrochemical thermodynamics; electrochemical kinetics of corrosion; passivity and properties of passive films on metals; polarization methods for measuring corrosion rates; Galvanic, concentration cell, pitting, and crevice corrosion; effects of metallurgical structure on corrosion; corrosion in selected corrosive environments; coatings and inhibitors; and materials selection and design. **Prerequisites:** MEEN 3322: Thermodynamics II, MEEN 2311: Materials Engineering

MEEN 4344: Materials in Design (3,0) Introduction to product design and development process, codes and standards, materials properties, tribology and wear, corrosion, and materials processing as it relates to a specific product design. **Prerequisite:** MEEN 3311 Manufacturing Processes; Co-requisite: MEEN 4393

Machine Design

MEEN 4351: Intermediate Dynamics (3,0) The course will include three-dimensional Newtonian kinematics and dynamics of rigid bodies; Lagrange's equations; analytical solutions for rigid body dynamics; and an introduction to variational methods. **Prerequisites:** MEEN 2312 Engineering Mechanics II: Dynamics, MEEN 3391 Design of Mechanisms

MEEN 4394: Advanced Control Systems (3,0) The course teaches the students how to model mechanical, electrical, hydraulic, and thermal subsystems and to design control systems. The course covers classical dynamics, multiple degrees of freedom vibrations, transient and steady-state performance, and control system design specifications. **Prerequisites:** MEEN 3432: Computational Methods, MEEN 4392: Feedback Control

General Engineering – GEEN

GEEN 1211: Introduction to Engineering (2,0) This course is an introduction to engineering and engineering design at the freshman level. The disciplines of civil, electrical, and mechanical engineering are defined. A systems approach to engineering design is used to solve open-ended engineering design problems related to civil, electrical, and mechanical engineering. Principles of teaming are emphasized throughout the course in accord with the design problem. **Prerequisite:** None

GEEN 2311: Engineering Mechanics I: Statics (3,0) The course involves equilibrium of rigid bodies, resultants of force systems, centroids, and moments of intertia. Kinematics and kinetics of particles and rigid bodies also are covered. **Prerequisites:** PHYS 1421: Physics for Engineers I, MATH 1423: Calculus II

GEEN 2211: Introduction to Computing (1,2) The course is an introduction to computer systems, problem solving methods and algorithm development. Structured programming is taught using the programming language C, or C++, and JAVA. It includes designing coding, debugging and documenting programs using techniques of software development cycle. MATLAB also is taught, enabling students to solve mathematical problems with this tool. **Prerequisite:** MATH 1324: Calculus III

GEEN 2313: Thermodynamics I (3,0) This course introduces students to the concepts of heat and energy and how they relate and interact. Mass systems, control volumes, reversible and irreversible processes, open and closed systems, and open and closed cycles are covered. **Prerequisites:** MATH 1324: Calculus III, CHEM 1421: Chemistry for Engineers I

GEEN 2314: Electric Circuits and Electronics (2,3) Designed to be taken by non-Electrical Engineering majors, this course covers electric circuit analysis, AC circuits and frequency response, transformers, power supplies, AC power and power distribution, diodes, op amps, logic gates, introduction to solid state devices, and sensors. Practical problems of solving electronic circuits will also be covered in this course. **Prerequisites:** PHYS 1422: Physics for Engineers II

GEEN 4311: Engineering Economy (3,0) This course teaches the basic principles and techniques of economic analysis and cost engineering. Applications are made to real engineering problems and processes. The use of economics in evaluating engineering designs is emphasized. **Prerequisite:** 90 student credit hours

GEEN 3311: Introduction to Fluid Mechanics (3,0) This course introduces students to the concepts of fluid statics and fluid dynamics. Fluid statics refers to a fluid at rest and the forces which act on the fluid in that state. Fluid dynamics refers to a fluid in motion and the forces that act on the fluid in that state. **Prerequisite:** GEEN 2313: Thermodynamics I

SUMMARY OF COLLEGE OF ENGINEERING COURSES AND NUMBER OF C.H / COURSE

COLLEGE OF ENGINEERING - GENERAL COURSES

Course No.	Course Name	Credit Hours	Classroom Hours		Others
			Class	Lab	
GEEN 1211	Introduction to Engineering	2 (2,0)	2	0	
GEEN 2311	Engineering Mechanics I: Statics	3 (3,0)	3	0	
GEEN 2312	Introduction to Computing	3 (3,0)	3	0	
GEEN 2313	Thermodynamics I	3 (3,0)	3	0	
GEEN 2314	Circuits I (also listed as COEN 2311: Circuits I)	3 (2,1)	2	0	Recitation session 1
GEEN 4311	Engineering Economy	3 (3,0)	3	0	
GEEN 3311	Introduction to Fluid Mechanics	3 (3,0)	3	0	
ASSE 4311	Learning Outcome Assessment III	3 (3,0)	3	0	

COLLEGE OF ENGINEERING - CIVIL ENGINEERING COURSES

Course No.	Course Name	Credit Hours	Classroom Hours		Others
			Class	Lab	
CVEN 2311	CAD for Civil Engineering	3 (2,1)	2	3	
CVEN 3311	Structural Analysis	3 (3,0)	3	0	
CVEN 3312	Reinforced Concrete Design	3 (3,0)	3	0	
CVEN 3322	Materials in Civil Engineering	3 (2,1)	2	3	
CVEN 3323	Engineering Geology	3 (3,0)	3	0	
CVEN 3331	Environmental Engineering Fundamental	3 (3,0)	3	0	
CVEN 3332	Hydraulic Engineering	3 (2,1)	2	3	
CVEN 3341	Engineering Measurements	3 (2,1)	2	3	
CVEN 3343	Engineering Probability & Statistics	3 (3,0)	3	0	
CVEN 3344	Sustainable Engineering	3 (3,0)	3	0	
CVEN 4313	Design of Steel Structures	3 (3,0)	3	0	
CVEN 4314	Construction Management	3 (3,0)	3	0	
CVEN 4323	Intro to Geotechnical Engineering	3 (2,1)	2	3	
CVEN 4324	Foundation Analysis and Design	3 (3,0)	3	0	
CVEN 4333	Water and Wastewater Treatment	3 (3,0)	3	0	
CVEN 4334	Air Pollution and Control	3 (3,0)	3	0	
CVEN 4342	Transportation Engineering	3 (3,0)	3	0	

COLLEGE OF ENGINEERING - ELECTRICAL ENGINEERING COURSES

Course No.	Course Name	Credit Hours	Classroom Hours		Others
			Class	Lab	
EEEN 2411	Circuits I	4 (3,3)	3	3	
EEEN 2312	Circuits II	3 (3,0)	3	0	Recitation Session 2 hrs / week
EEEN 3331	Digital Systems	3 (2,1)	2	3	
EEEN 3341	Signals and Systems	3 (3,0)	3	0	Project development Time each week as needed outside of class
EEEN 3361	Electromagnetic Fields and Waves	3 (3,0)	3	0	
EEEN 3391	Probability and Random Signal Analysis	3 (3,0)	3	0	
EEEN 3392	Advanced Applied Mathematics	3 (3,0)	3	0	
EEEN 3421	Electronics I	4 (3,1)	3	3	
EEEN 3422	Electronics II	4 (3,1)	3	3	
EEEN 3432	Microcontroller Systems	4 (3,1)	3	3	
EEEN 3461	Electric Machinery	4 (3,1)	3	3	
EEEN 4342	Digital Communication Systems	3 (3,0)	3	0	
EEEN 4343	Wireless Communication Systems	3 (3,0)	3	0	
EEEN 4371	Electric Power Systems	3 (3,0)	3	0	
EEEN 4372	Electric Power Transmission and Distribution	3 (3,0)	3	0	
EEEN 4393	EE Senior Design I	3 (3,1)	3	3	
EEEN 4394	EE Senior Design II	3 (3,1)	3	3	Team project development (outside of class)
EEEN 4423	Sensors and Instrumentation	4 (3,1)	3	3	

EEEN 4424	Power Electronics	4 (3,1)	3	3	
EEEN 4440	Communication Systems	4 (3,1)	3	3	
EEEN 4451	Automatic Control Systems	4 (3,1)	3	3	

COLLEGE OF ENGINEERING - MECHANICAL ENGINEERING COURSES

Course No.	Course Name	Credit Hours	Classroom Hours		Others
			Class	Lab	
MEEN 2311	Materials Engineering	3 (3,0)	3	0	
MEEN 2312	Engineering Mechanics II: Dynamics	3 (3,0)	3	0	
MEEN 2313	Solid Mechanics	3 (2,3)	2	3	
MEEN 3111	Thermofluids & Energy Lab	1 (0,3)	0	3	
MEEN 3101	Machine Shop Practice & Safety	1 (0,3)	0	3	
MEEN 3311	Manufacturing Processes	3 (3,0)	3	0	
MEEN 3322	Thermodynamics II	3 (3,0)	3	0	
MEEN 3432	Computational Methods	4 (3,3)	3	3	
MEEN 3333	Heat Transfer	3 (3,0)	3	0	
MEEN 3391	Design of Mechanisms	3 (3,0)	3	0	
MEEN 3394	Computer Aided Design	3 (2,3)	2	3	
MEEN 3395	Mechanical Vibrations	3 (2,3)	2	3	
MEEN 4392	Feedback Control	3 (2,3)	2	3	
MEEN 4393	Machine Design	3 (3,0)	3	0	
MEEN 4311	Principles of Heating, Ventilating, and Air Conditioning (HVAC)	3 (2,3)	2	3	
MEEN 4322	Power Generation	3 (3,3)	3	3	
MEEN 4396	Mechanical Engineering Design I	3 (2,2)	2	2	

Course No.	Course Name	Credit Hours	Classroom Hours		Others
			Class	Lab	
MEEN 4397	Mechanical Engineering Design I	3 (2,2)	2	2	
MEEN 4312	Fluid Mechanics	3 (3,0)	3	0	
MEEN 4315	Principles of Building Energy Analysis	3 (3,0)	3	0	
MEEN 4331	Internal Combustion Engines	3 (3,0)	3	0	
MEEN 4332	Turbomachinery	3 (3,0)	3	0	
MEEN 4341	Corrosion Engineering	3 (3,0)	3	0	
MEEN 4344	Materials in Design	3 (3,0)	3	0	
MEEN 4351	Intermediate Dynamics	3 (3,0)	3	0	
MEEN 4394	Advanced Control Systems	3 (3,0)	3	0	