ENGINEERING (EG)

EG 0031 Fundamentals of Engineering I **3 Credits**
Corequisite: PS 0115.
This course provides core engineering knowledge and competencies in a highly interactive class format. Topics include professional skills such as technical writing and presentation, guidelines for professional engineering practice, and career preparation. Introduction to the fields, roles, and industries of engineering also serves as a basis for selection of engineering major field. Hands-on team projects are core learning experiences. They form a structured introduction to the implementation of principles of design and engineering methodologies, system engineering management, and presentation skills. Guest presenters and field trips augment this course, which is taught by interdisciplinary faculty teams.

EG 0060 STEM of Guitar **3 Credits**
Fee: $250 Engineering Lab Fee
This course looks at the design elements, manufacturing and assembly of solid-body electric guitars. Science, technology, engineering, and mathematics (STEM) concepts that relate directly to guitars are used to help students make an applied learning connection. Each student will construct their own electric guitar. Course will cover wood species and the environment, guitar headstock design features, chemistry of finishes, math applications in a guitar, physical science aspects of the guitar such as mechanical systems, concepts of sound waves, string tension, fretboard layout, intonation, and electronics. Studio-style class, lecture and lab time combined throughout course. The $250 lab fee applies to cover materials.

EG 0130 Engineering Graphics I **3 Credits**
This is a basic course in engineering graphics principles and is taught simultaneously with SolidWorks, a 3D modeling design application. Using traditional and computer design, the course stresses geometric constructions, orthographic projection, dimensioning, sectional views, 3D part modeling, assembly modeling, drafting and engineering drawings, animation and geometric tolerancing. The course stresses aesthetics and technical sketching. You will gain a working knowledge of SolidWorks in engineering design. Course requires a computer that runs Microsoft Windows. Formerly CD 0211.

EG 0145 Mathematical Analysis **3 Credits**
Attributes: EVAP Environmental Studies: Applied Professional Skills
Corequisites: EG 0145P, MA 0146.
Prerequisite: MA 0145.
In this course students will learn mathematical and numerical methods such as differentiation, integration, and Fourier analysis and how to apply these methods to solve scientific problems. Additionally, the course will cover statistics including data analysis, trend fitting, datacorrelation, and interpolation. Students will learn to use MATLAB as a tool but also become proficient in programming.

EG 0145P Mathematical Analysis PLG **0 Credits**

EG 0210 Introduction to Nanoscience and Nanotechnology I **3 Credits**
This course will provide a highly interdisciplinary introduction to the science of nanoscale materials (nanoscience). The course will survey the new field of nanoscience/nanotechnology, aiming to motivate interest in and heighten awareness of this field. Its many potential applications in medicine, biology, electronics and optoelectronics, engineering, materials science and chemistry, open a broad new horizon to an exciting technology to serve societal needs. Topics will include historical background, characterization techniques, physics and chemistry of nanoscale materials, fabrication techniques, characterization methods, nanoscale applications (nanotechnology), and ethical/societal considerations.

EG 0212 Introduction to Nanoscience and Nanotechnology II **4 Credits**
Prerequisite: EG 0210.
This course will continue a highly interdisciplinary, mathematically-based overview, providing a solid foundation in nanoscale materials, techniques, and applications (nanoscience). The course will continue to broadly survey the new field of nanoscience/nanotechnology. Its many potential applications in medicine, biology, electronics and optoelectronics, engineering, materials science, and chemistry, open a broad new horizon to an exciting technology to serve societal needs. Topics of discussion, such as quantum dots, nanowires, nanotubes, MEMS and nanobiology, will be reinforced through hands on laboratory experience with nanomaterial synthesis, device fabrication techniques, and characterization methods. Intended for students interested in the minor in nanotechnology.

EG 0260 Robots **3 Credits**
Prerequisite: PS 0115.
Introductory course in robotics develops understanding of how robotic systems integrate sensors, actuators, and control systems to achieve specific goals. Principles of autonomy, programming, wireless communications, sensor applications, mechatronics, electrical power, electric motors, pneumatics, structure, and locomotion will be understood and applied. Design of robotic subsystems will utilize multiple areas of knowledge. The course will involve application of statistical analysis to quantify robot performance. Service learning is an integral part of the course. All participants will participate in weekly mentoring of a youth robotics competition team to put into practice the principles learned in class, and to learn through community interaction from other students using robots to accomplish different feats.

EG 0300 Feedback Control Systems **3 Credits**
Prerequisites: MA 0251, EE 0301.
This course emphasizes analysis and synthesis of closed loop control systems using both classical and state-space approaches with an emphasis on electro-mechanical systems. The mathematical requirements include the Laplace transform methods of solving differential equations, matrix algebra, and basic complex variables. The discussion of classical control system design includes the modeling of dynamic systems, block diagram representation, time and frequency domain methods, transient and steady state response, stability criteria, controller action [Proportional (P), proportional and integral (PI), Proportional, integral, and derivative (PID) and pseudo-derivatives feedback], root locus methods, the methods of Nyquist and Bode, and dynamics compensation techniques. The discussion of state-space methods includes formulation and solution (analytical and computer-based) of the state equations and pole-placement design. The course integrates the use of computer-aided analysis and design tools (MATLAB) so as to ensure relevance to the design of real world controlled electro-mechanical systems using case studies and applications to electrical and mechanical systems. Includes lab (hardware-based) exercises. Formerly MC 0300.

EG 0305 Design of Mechatronics Systems **3 Credits**
Prerequisite: Senior standing.
This course covers development of mechatronics theory and applications to systems dependent upon the integration of mechanical, electrical and computer engineering. Students assemble hardware components to create a product design that fulfills a specified task in a mechatronics system. Students develop design skills in mechanisms, electrical devices, and software to create, test, and verify system function. Formerly MC 0305.

EG 0315 Engineering Applications of Numerical Methods **3 Credits**
Prerequisite: CS 0131.
Topics include root-finding, interpolation, linear algebraic systems, numerical integration, numerical solution of ordinary and partial differential equations, modeling, simulation, initial boundary value problems, and two point boundary value problems. Formerly EG 0325.

EG 0330 Engineering Graphics II **3 Credits**
This course introduces CATIA Version 5; the leading CAD/CAM/CAE application used by automotive, aerospace, shipbuilding, and consumer goods industries. It provides mechanical, electrical, automotive, aerospace, and marine engineers and architects with the design tools to take products from concept to completion - in one seamless application. This course covers basic solid modeling concepts of individual sheetmetal and machined parts from detailed drawings. "Complex Shape Modeling" using "wireframe concepts" and "surface-based" modeling is covered. Building of assemblies of components and control of their positioning and orientation, as well as motion simulation is covered. Fully detailed production drawings of components and assemblies are also covered. Formerly CD 0212.

EG 0350 Advanced Programmable Logic Control (PLC) Systems **3 Credits**
Prerequisites: PS 0116, MA 0245.
This course will give students advanced concepts in programmable logic controllers and their applications and interfacing to industrial controls in the areas of automation, manufacturing, and others. Topics include bit operations, data manipulation, industrial PLC network utilizing Ethernet, ControlNet, and DeviceNet. Data sharing and distributed PLC programming techniques along with fundamentals of touch panel programming and operation are studied. State of the art software used: MultiSim, LabView, Cosivis, Veep, Automation Studio, and RS Logix 500. It will include also: input/output ports, intermittent and continuous process control, arithmetic and comparison instruction, function block diagrams, indirect and indexed addressing, and sequential function charts. The course will consist of: lectures, group discussions, case studies, a term project, and computer simulation. Formerly MF 0350.

EG 0360 Engineering Project Management **3 Credits**
Attributes: HASM Humanitarian Action Minor Skills/Method Course
This course concentrates on the general methodology of managing an engineering project from concept to operational use with emphasis on the functions, roles, and responsibilities of the project manager. Study of the basic principles and techniques related to controlling resources (i.e. people, materials, equipment, contractors, and cash flow) to complete a project on time and within budget while meeting the stated technical requirements. Through group and individual activities, including case study review and field work, students will learn to apply project management tools and techniques. The course will be taught by teaching each phase of project management as we complete the relevant aspects of the project in the field. There will be some classroom time for introducing concepts, and planning. However, the majority of time each day will be spent in the field executing the project, putting into practice the phases of project management. The course will prepare students with the ability to learn the necessary background information and hands-on technical skills, to be flexible and adaptable in difficult environments. These skills will be valuable in many areas, particularly in the planning and execution of humanitarian action and engineering in developing countries. Enrollment by permission only. Students must be able to study abroad.

EG 0390 Senior Design Project I **3 Credits**
Prerequisite: Completion of all non-elective program courses; completion of other program requirements to enable graduation within the year of completion of EG 0391.
In this capstone course, students work in teams on advanced projects that emphasize engineering design with due attention to design constraints and engineering standards. The overarching scope of this course is to transform engineering students to practicing engineers. Under the guidance of a faculty instructor and a mentor, each team conducts literature searches, write a technical proposal and its members develop skills in information analysis and synthesis; they model and test prototypes of their devices, and make frequent oral and poster presentations of their work to faculty and peers, and submit timely progress reports. In the process, they receive instruction in effective communication and presentation practices, and develop an appreciation of teamwork and collective success. This two-semester course begins in the fall of the academic year and concludes at the end of the spring term with a final team oral presentation and a final written report, and a working prototype of the team's project. It also includes sample hardware fabrication in the machine laboratory.

EG 0391 Senior Design Project II **3 Credits**

Prerequisite: EG 0390.

In this capstone course, students work in teams on advanced projects that emphasize engineering design with due attention to design constraints and engineering standards. The overarching scope of this course is to transform engineering students to practicing engineers. Under the guidance of a faculty instructor and a mentor, each team conducts literature searches, write a technical proposal and its members develop skills in information analysis and synthesis; they model and test prototypes of their devices, and make frequent oral and poster presentations of their work to faculty and peers, and submit timely progress reports. In the process, they receive instruction in effective communication and presentation practices, and develop an appreciation of teamwork and collective success. This two-semester course begins in the fall of the academic year and concludes at the end of the spring term with a final team oral presentation and a final written report, and a working prototype of the team's project. It also includes sample hardware fabrication in the machine laboratory.

EG 0398 Internship **1-3 Credits**

EG 0399 Independent Study **1-4 Credits**

EG 0400 Internship **1-3 Credits**