

GENERAL ENGINEERING (EGNR)

EGNR 101 Introduction to Engineering 2 Credit Hours (1,2)

An introduction to the different areas of study within the fields of electrical and mechanical engineering. Lecture topics and laboratory activities will introduce computer programming, computer simulation exercises, data-acquisition systems, microcontroller systems, communications, robotic and manufacturing applications, material science and dynamics.

Pre or Corequisite(s): MATH102

EGNR 102 Concepts History Engineering 2 Credit Hours (2,0)

This course provides instruction on problem solving techniques using engineering tools and concepts as students work on an engineering design project. Topics in engineering ethics and the engineering work experience are discussed. A history of engineering and the development of the specific engineering fields are presented.

Pre or Corequisite(s): MATH102

EGNR 103 Engineering Orientation 1 Credit Hour

This course provides an orientation to the engineering and engineering technology fields at Lake Superior State University, including robotics. Students are introduced to the engineering professional organizations and are encouraged to participate in professional activities. Laboratory exercises focus on introducing students to the engineering facilities and programmatic options within the engineering and engineering technology disciplines. Academic success strategies are also presented. (0.5,1) 1

Pre or Corequisite(s): MATH102

EGNR 140 Linear Alg Num Apps Engineers 2 Credit Hours (1,3)

This course covers the engineering application of concepts from applied mathematics, iterative programming and computational software packages. Applications of linear algebra are introduced. Iterative programming emphasizes loops, conditional statements and user input-output. The lab also includes instruction on commercially-available software used to perform computational tasks of applied interest.

Prerequisite(s): MATH131

Pre or Corequisite(s): MATH112 or MATH151

EGNR 245 Calculus Applications For Tech 3 Credit Hours (2,2)

This course covers engineering applications of differential and integral calculus, including areas, volumes of solids, vector analysis, matrix algebra, polar and cylindrical coordinate systems, partial differentiation, and multiple integrals for typical engineering technology problems. Application and solutions to engineering problems will emphasize and require the use of commercial software packages such as MATHCAD and MATLAB.

Prerequisite(s): EGNR140

EGNR 250 Cooperative Education 2 Credit Hours

A practicum in which students work in a supervised engineering capacity (on site) with industry. The student is expected to work at least 6 hours per week in an industrial setting. The student's experience must be related to his/her academic studies and thus this experience contributes significantly to his/her professional development. May be repeated for a maximum of 4 credits. (2) 2

Prerequisite(s): Permission of Instructor

EGNR 260 Engineering Research Methods 2 Credit Hours (1,3)

This is an introductory course covering research methods in engineering and engineering-related fields. The student will be involved in faculty-supervised and guided research activities such as assisting with developing experiments, gathering data and analyzing results. Much time will be spent learning about the research project, past experiments and future directions. Can be repeated for credit.

Prerequisite(s): permission of instructor

EGNR 261 Energy Systems/Sustainability 3 Credit Hours (3,0)

The course provides an introduction to energy conversion systems and discusses issues related to the sustainability of each system. Topics include basic energy definitions, traditional energy resources and reasons for pursuing alternative energy resources, renewable and nonrenewable energy resources, energy storage, and electrical grid integration. Topics also include policy as well as social, economic, and environmental sustainability issues as they relate to energy conversion.

Prerequisite(s): MATH102 or equivalent

EGNR 265 C Programming 3 Credit Hours (3,0) (3,0,1)

An introductory course in 'C' programming with an emphasis on structured programming techniques and on utilizing 'C' to solve engineering-related problems. Topics include looping techniques, input and output to files, conditional flow of control, writing and utilizing functions, pointers, 1D and 2D arrays, and data storage.

Prerequisite(s): MATH111 and MATH131 and sophomore standing

EGNR 310 Quality Engineering 3 Credit Hours (3,0)

Provides a coverage of classical and modern methods of quality control and quality engineering. Topics include quality control principles and terminology, classical qualitative and quantitative quality control methods, including statistical process control procedures, robust design methods as applied to product design and design of experiments, and an overview of quality management systems used in industry.

Pre or Corequisite(s): MATH207 or MATH308

EGNR 340 Numerical Methods Engineers 1 Credit Hour (0,2)

This course addresses numerical methods for the solution of problems in linear algebra, numerical integration, root searching, linear and non-linear regression, ordinary and partial differential equations, and eigenvalue analysis. It emphasizes proficiency in independently programming algorithms for the simulation of physical systems with engineering applications, an understanding of how these algorithms work and are structured, and an appreciation for the value of computational efficiency in numerical methods.

Prerequisite(s): EGNR140

Pre or Corequisite(s): MATH310 and (CSCI121 or EGNR265)

EGNR 346 Probability/Stats Lab Engineer 1 Credit Hour (0,2)

This laboratory accompanies MATH308, a calculus-based introduction to the basic theory of probability and statistics. Topics include methods of data collection, experimental design, interpretation of data and use of a statistical software tool.

Prerequisite(s): EGNR140

Pre or Corequisite(s): MATH308

EGNR 361 Energy Sys Sustainability Lab 1 Credit Hour

The course explores the technical and implementation aspects of sustainable energy systems. Students will design, construct, and/or analyze various energy conversion systems. They will also design and implement subsystems that can store energy and construct connections between energy sources, energy storage subsystems, and the electrical grid.

Prerequisite(s): (CHEM108 or CHEM115), (EGET270 or EGEE210), MATH131 or higher, excluding MATH207, (PHYS221 or PHYS231); (0,3) 1

Pre or Corequisite(s): EGNR261

EGNR 450 Cooperative Educ Project I 4 Credit Hours

A practicum in which students work in a supervised engineering capacity (on site) with industry. This is the first of a two-part sequence that can replace the senior year Engineering Design Project II (EGNR495). The focus of this course is the development of the co-op project proposal and the initiation work on the co-op project. The expectation is that at least 60% of a forty hour work week is devoted to completing the project. (4) 4

Prerequisite(s): EGNR250 Cooperative Education

EGNR 451 Cooperative Educ Project II 3 Credit Hours

A practicum in which students work in a supervised engineering capacity (on site) with industry. This is the second of a two-part sequence that can replace the senior year Engineering Design Project II (EGNR495). The focus of this course is the completion of the co-op project. The documentation at the completion of the project includes an update presentation and a final report/final presentation. The expectation is that at least 60% of a forty hour work week is devoted to completing the project. (3) 3

Prerequisite(s): EGNR450 Cooperative Education

EGNR 460 Engrg Research Project I 3 Credit Hours (2,3)

This is the second part of a three-course sequence in which students pursue, with faculty guidance, a research project with substantial enough scope, originality, scientific relevance, and broader significance to be comparable to works typically presented at reputable international conferences. In this second stage, building on a pilot work in EGNR260, a more comprehensive literature review will be conducted, a clearly-stated hypothesis will be developed to guide the remainder of the project, and methodologies to test it will be developed and initiated (to be fully completed in the subsequent 3-cr course EGNR461).

Prerequisite(s): Senior Status, EGNR260 and permission of instructor

EGNR 461 Engrg Research Project II 3 Credit Hours (1,6)

This is the third part of a three-course sequence in which students pursue, with faculty guidance, a research project with substantial enough scope, originality, scientific relevance, and broader significance to be comparable to works typically presented at reputable international conferences. In this third stage, students implement their research plan developed in EGNR460, testing their guiding hypothesis. Results and findings must be reported in oral and/or written forms to appropriate constituencies outside the LSSU audience. Students who plan to take EGNR461 must complete both EGNR460 and EGNR461 in the same academic year.

Prerequisite(s): EGNR460 and permission of instructor

EGNR 490 Sp Topics in Engr: (Topic) 1-4 Credit Hours (1-4,0)

Special studies and/or research in engineering for individuals or small seminar groups. Course content to be arranged with instructor and with approval of the department head. This course may be repeated for a maximum of eight credits.

EGNR 491 Engineering Design Project I 3 Credit Hours (2,3)

This course provides students with the skills necessary for successful completion of their design project. Topics include group dynamics, ethics, timelines, resource allocation, project management and performance evaluations. Skills in oral and written communications, problem conceptualization, creative problem solving and technical presentations are developed. Students who plan to take EGNR491 and EGNR495 must complete both in the same academic year.

Prerequisite(s): Permission of instructor on the basis of senior status and expected graduation on or before December of the following calendar year, and one of the following based on degree: Computer Engineering: CSCI201 and (EGEE320 or EGEE355); Electrical Engineering: EGEE370 and (EGEE310 or EGEE330); Mechanical Engineering: EGME350; Robotics Engineering: EGRS385 and (EGRS305 or EGRS372); Electrical Engineering Technology: EGET175 and EGRS365 and (EGEE320 or EGEE355 or EGRS325); Manufacturing Engineering Technology: EGMT216 and EGRS365; Mechatronics: EGRS381 and (CSCI265 or EGRS235 or EGRS325 or EGRS375)

EGNR 495 Engineering Design Project II 3 Credit Hours (1,6)

A continuation of EGNR491. This course provides students with the skills necessary for successful completion of their design projects. Topics include group dynamics, ethics, timelines, resource allocation, project management and performance evaluations. Skills in oral and written communications, problem conceptualization, creative problem solving, and technical presentations are developed. The dropping or failing of EGNR495 will result in student repeating both EGNR491 and EGNR495. Students who plan to take EGNR491 and EGNR495 must complete both in the same academic year.

Prerequisite(s): EGNR491

EGNR 496 Senior Directed Project 3 Credit Hours (1,6)

This course is designed to allow industrial technology majors the opportunity to implement a project while working collaboratively with engineering and engineering technology students. Students will be expected to use the skills and knowledge from previous course work. Project outcomes should relate to the students individual areas of study and represent a synthesis of the previous learning under the supervision of a faculty member.

Prerequisite(s): Approval of the department chair, senior status and expected graduation on or before December of the following calendar year