

# EGEN - General Engineering

## EGEN 102 Intro to Engineer Comp Apps: 3 Credits (3 Lec)

COREQUISITE: M 171Q. (F, Sp) Effective methods for applying the computer to common numerical problems encountered in chemical engineering. Chemical engineering examples will provide a basis for more comprehensive problems encountered in the other professional level courses

## EGEN 105 Introduction to General Engineering: 2 Credits (1 Lec, 1 Lab)

Provides students an opportunity to explore the fields of engineering, engineering technology, and computer science. Other topics include engineering design, career opportunities, professionalism, and ethics.

## EGEN 110US Foundations in Engineering & Computing Mindset: 3 Credits (2 Lec, 1 Lab)

(F) Engineering or computer science majors. This first-year engineering course sets a foundation of engineering and computing as mindsets accessible to anyone and key to solving immediate problems like – What major should I choose? – and more complex challenges like – How do I contribute to developing infrastructure for electric cars? As a US Core, students are engaged as critical thinkers and problem solvers; local and global citizens; and effective communicators These attributes will lead to their ability to contribute as 21st Century engineers and computer scientists.

## EGEN 115 Engineering Graphics: 1 Credits (1 Lec)

() No longer offered. Introductory course developing freehand sketching for engineering design graphics. Skills will be developed for sketching and interpreting dimensioned multi-view drawings, pictorials, sections, and assemblies.

## EGEN 125CS Tech, Innovation, and Society: 3 Credits (3 Lec)

Old Description This course explores the innovative engineering processes that connect the creative elements of science and engineering with solving problems of everyday life. Topics include understanding the role of creativity, public safety and ethics in creating technological solutions. Case studies are investigated, including applying critical thinking to exploring how innovation can help society. New Description This course explores the role scientific thinking plays in shaping society's construction of meaning and purpose. Topics include the socio-cultural impact of science and technology through time, the ethical implications of current technology, and individual responsibility in shaping the direction of technological development. Students are asked to place their understanding of self into a broader socio-cultural context that has been greatly influenced by technological development.

## EGEN 200 Designing Our Community: 1 Credits (1 Other)

This course is designed to explore issues in engineering and college academics for American Indian students and other under-represented students in Engineering fields. The course will provide a learning community among students to ensure success in achieving their professional goals.

## EGEN 201 Engineering Mechanics-Statics: 3 Credits (3 Lec)

PREREQUISITE: PHSX 220 or PHSX 240

COREQUISITE: M 273 or M 283. (F, Sp, Su) Equilibrium of particles and rigid bodies; static analysis of structures including trusses, beams, frames and machines; coulomb friction; area and mass centroids, moments and products of inertia

## EGEN 202 Engineering Mechanics -- Dynamics: 3 Credits (3 Lec)

PREREQUISITE: EGEN 201 or EGEN 221 and M 273 or M 283.

Kinematics, kinetics, work-energy, and impulse-momentum for particles and rigid bodies. Common Exams. -

## EGEN 203 Applied Mechanics: 3 Credits (3 Lec)

PREREQUISITE: PHSX 205 or PHSX 220 or PHSX 240; and M 165Q or M 171Q or M 181Q. (F, Sp) Force systems in equilibrium and applications to structural trusses and frames; section properties; distributed force systems; shear and moment distributions in beams; basic particle dynamics

## EGEN 205 Mechanics of Materials: 3 Credits (3 Lec)

PREREQUISITE: EGEN 201 or EGEN 221 and M 273 or M 283. (F, Sp, Su) Stress and strain, Hooke's Law, thermal strain, torsion, bending of beams, combined stress, limit analysis, energy methods, virtual work, column theory. -

## EGEN 208 Applied Strength of Materials: 3 Credits (3 Lec)

PREREQUISITE: EGEN 201 or EGEN 203 or EGEN 221 and M 166 or M 172 or M 182. (F, Sp) Equilibrium and deformation of structural elements; concepts of stress and strain and interrelationship; representation and transformation of combined stress states; axial, torsional and flexural stresses and deformation; column buckling. -

## EGEN 221 Honors Statics: 3 Credits (2 Lec, 2 Lab)

PREREQUISITE: PHSX 200 or PHSX 240 and good standing in University Honors

COREQUISITE: M 273 or M 283. () On demand. Honors offering of engineering statics, including topics dealing with equilibrium of particles and rigid bodies; static analysis of structures including trusses, beams, frames and machines; coulomb friction; area and mass centroids, moments and products of inertia

## EGEN 290R Undergraduate Research: 1-6 Credits (1-6 Other)

() On demand. Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research. May be repeated.

Repeatable up to 99 credits.

## EGEN 291 Special Topics: 1-4 Credits (1-4 Lec)

PREREQUISITE: None required but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number

Repeatable up to 12 credits.

## EGEN 292 Independent Study: 1-3 Credits (1 Other)

PREREQUISITE: Consent of instructor and approval of department head.

() On demand. Directed research and study on an individual basis

Repeatable up to 6 credits.

## EGEN 310R Multidisciplinary Engineering Design: 3 Credits (3 Lec)

PREREQUISITE: Junior standing in an Engineering curriculum or consent of instructor. Introduces engineering students to topics such as design process, creative design, project management, teamwork, and technical leadership while highlighting the skills needed to work in a multi-disciplinary environment

## EGEN 324 Applied Thermodynamics: 3 Credits (3 Lec)

PREREQUISITE: PHSX 205 or PHSX 220

COREQUISITE: M 166 or M 172. (F, Sp) General treatment of the basic laws of thermodynamics and engineering applications with introduction to heat transfer for curricula not requiring EMEC 320/EMEC 321 series

## EGEN 325 Engineering Economic Analysis: 3 Credits (3 Lec)

PREREQUISITE: Junior standing, M 171Q or M 165Q, or instructor approval. (Sp) Methods for comparing and evaluating capital investment alternatives. Concepts include the time value of money, rates of return, cash flows, incremental analysis, depreciation, influences of taxes, inflation and deflation, depreciation, replacement analysis. Emphasis is placed upon evaluating various engineering alternatives. Some open-ended design problems are included

**EGEN 330 Business Fundamentals for Technical Professionals: 3 Credits (3 Lec)**

PREREQUISITE: Junior Standing; and M 171Q or M 165Q. (F, Sp, Su) Basic business topics for engineers and other technical professionals. Introduces key topics related to financial statements, accounting practices, ethics, and evaluation of capital investment alternatives including present worth, rate of return, and after-tax analysis methods

**EGEN 331 Applied Mechanics of Fluids: 3 Credits (3 Lec)**

PREREQUISITE: EGEN 208 or EGEN 205. Basic principles of fluid mechanics: pressure measurement, forces on submerged areas, fluid flow through conduits, open channel flow, forces caused by fluids in motion, pumps

**EGEN 335 Fluid Mechanics: 3 Credits (3 Lec)**

PREREQUISITE: EGEN 202 and EGEN 205. (F, Sp) Introduction to modern fluid mechanics

**EGEN 350 Applied Engineering Data Analysis: 2 Credits (2 Lec)**

PREREQUISITE: M 166 or M 172. (F, Sp, Su) An overview of data variability and applied statistical analysis techniques for a broad range of engineering disciplines. Topics include fundamentals of probability, essential probability distributions, hypothesis testing, experimental design strategies, and regression in the context of engineering applications

**EGEN 365 Introduction to Mechatronics: 3 Credits (2 Lec, 1 Lab)**

PREREQUISITE: CSCI 112 or CSCI 127 or EMEC 303 or consent of instructor; EGEN 202 or ETME 340; EELE 203 or EELE 250. (Sp) Course introduces students to the design of mechatronic systems through integration of electrical engineering, mechanical engineering, and computer science disciplines. Topics include measurement and sensing, mechanical and electrical actuators, hardware/software interfacing, basic control of mechatronic systems, and graphical simulation software. A significant lab component culminates in an open-ended team design project

**EGEN 415 Advanced Mechanics of Solids: 3 Credits (3 Lec)**

PREREQUISITE: EGEN 205. Advanced topics in deformational mechanics of materials; application to contemporary engineering problems. Computer applications

**EGEN 420 Ice and Snow Mechanics: 3 Credits (3 Lec)**

PREREQUISITE: EGEN 205. From an engineering perspective, ice and snow are very complex materials. This course will assist students in understanding and predicting the physical and thermo-mechanical processes of ice and snow, their roles in the environment, and their implications for engineering. A solid grasp of calculus, physics and engineering mechanics will be required to be able to study these processes

**EGEN 435 Fluid Dynamics: 3 Credits (3 Lec)**

PREREQUISITE: EGEN 335 or ECIV 337. (Sp) Equations governing steady and unsteady fluid flow; applications to contemporary engineering problems. Computer applications

**EGEN 488 Fundamentals of Engineering Exam: 0**

Must be in final semester of program. Student participation in engineering program assessment. Requirement to complete the Fundamentals of Engineering (FE) examination or the Major Field Test in Computer Science (CS majors only). Students register for the FE exam through the NCEES website (<https://ncees.org/>) and then schedule a time to take the exam online. Documentation must be submitted to the Engineering Dean's Office prior to Finals Week.

**EGEN 490R Undergraduate Research: 1-4 Credits (1 Other)**

PREREQUISITE: Consent of instructor. (F, Sp, Su) Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. May be repeated Repeatable up to 12 credits.

**EGEN 491 Special Topics: 1-4 Credits (1-4 Lec)**

PREREQUISITE: Course prerequisites as determined for each offering. On demand. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number Repeatable up to 12 credits.

**EGEN 492 Independent Study: 1-3 Credits (1 Other)**

PREREQUISITE: Junior standing, consent of instructor, and approval of Department Head. Directed research and study on an individual basis Repeatable up to 4 credits.

**EGEN 494 Engineering Peer Academic Leader Foundations: 1 Credits (1 Lec)**

PREREQUISITE: Acceptance into the College of Engineering Peer Academic Leaders program. Students will learn skills to enhance their ability to interact with individuals from underrepresented or disadvantaged groups within the student population. Leadership potential will be developed through identification of implicit bias, gender schemas, and microaggressions and emphasize the student's role in becoming an effective agent of change Repeatable up to 6 credits.

**EGEN 498 Internship: 1-3 Credits (1-3 Other)**

PREREQUISITE: Junior standing, consent of instructor and approval of Department Head. An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field. Students may not take this course the semester they graduate Repeatable up to 12 credits.

**EGEN 498Z Internship: 1-3 Credits (1-3 Other)**

PREREQUISITE: Junior standing, consent of instructor and approval of Department Head. An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field. Students may not take this course the semester they graduate Repeatable up to 12 credits.

**EGEN 505 Advanced Engineering Analysis: 3 Credits (3 Lec)**

PREREQUISITE: EMEC 425 or EMEC 326 or EGEN 335. (F) Mathematical modeling of engineering systems, physical interpretation of ordinary and partial differential equations and methods of solution

**EGEN 506 Numerical Sol to Engr Problems: 3 Credits (3 Lec)**

(Sp) Numerical methods used to solve common engineering research problems. Solutions to nonlinear equations. Optimization methods.

**EGEN 511 Engineering Methods for Teachers: 3 Credits (2 Lec, 1 Other)**

() Spring, even years. This course is designed to introduce the concepts of engineering technology design to equip teachers of science to meet and exceed emerging standards of teaching engineering process K-12. A balanced approach of engineering processes and educational pedagogy will be the cornerstones of the course. Offered Spring.

**EGEN 541 Thry Magnetic Resonance Imag I: 3 Credits (3 Lec)**

PREREQUISITE: Graduate standing, or consent of instructor. Advanced topics in NMR phenomena including relaxation, diffusion, chemical shift, and magnetic susceptibility, as well as experimental aspects including phase cycling, magnetic field gradients, rf coil, tuning and matching and pulse sequence development will be covered

**EGEN 542 Thry Magnetic Resonance Imag II: 3 Credits (3 Lec)**

PREREQUISITE: Graduate standing. Consent of Instructor. Advanced topics in nuclear magnetic resonance phenomena focusing on molecular dynamics and pulse sequence development for measuring complex dynamics will be covered