ENGINEERING & COMPUTER SCIENCE (ECS)

ECS 100 Selected Topics (1-6 Credits)
Engineering & Comp Sci
Exploration of a topic (to be determined) not covered by the standard curriculum but of interest to faculty and students in a particular semester.
Repeatable 12 times for 36 credits maximum

ECS 101 Introduction to Engineering and Computer Science (3 Credits)
Engineering & Comp Sci
Gateway course: Discussion of disciplines within the college, technical communication, presentation of technical results, professional behavior, ethics, problem solving, modeling, and data analysis. Laboratory topics: computers, computer language, and software packages.
Shared Competencies: Communication Skills (https://coursecatalog.syracuse.edu/shared-competencies/communication-skills/)

ECS 102 Introduction to Computing (3 Credits)
Engineering & Comp Sci
Computing concepts. Principles of programming. Applications of computing concepts to problem solving in engineering and computer science. Laboratory topics will include problem solving projects from various disciplines within the college.

ECS 103 First Year Student Success Forum (1 Credit)
Engineering & Comp Sci
Gives new LCS students tools for success including study and time management skills, leadership; transition issues; academic policies and university resources; through lecture, small group meetings with their peer mentor, and hands-on activities.

ECS 104 Engineering Computational Tools (3 Credits)
Engineering & Comp Sci
Elementary numerical techniques for root finding, sets of equations, curve fitting, differentiation, integration. Programming concepts: conditional branching, loops, etc. Examples of engineering calculations. Use of spreadsheets and interpreted programming languages.
Coreq: MAT 295
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/)

ECS 105 ECS SummerStart Supplemental Math Workshop (1 Credit)
Engineering & Comp Sci
Workshop designed to supplement the theory taught in math courses. Design problems will incorporate course work. Limited enrollment/special permission.
Repeatable 8 times for 8 credits maximum

ECS 109 ECS SummerStart Seminar (1 Credit)
Engineering & Comp Sci
Designed to assist first-year students with their transition from high school to the University setting. Introduction of resources that will assist in the student's academic, social, cultural, and personal development through interactions with various representatives.

ECS 110 Introduction to Engineering Mathematics (3 Credits)
Engineering & Comp Sci
This course brings together mathematics and engineering by quantifying and interpreting rates of change through the analysis of linear and non-linear phenomena and how these phenomena change with respect to time.

ECS 114 Academic Excellence Workshop for Pre-Calculus (1 Credit)
Engineering & Comp Sci
Designed to supplement the theory taught in pre-calculus. Problems will incorporate course work. The computational component is designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: MAT 193 or MAT 194

ECS 115 Academic Excellence Workshop for Calculus I (1 Credit)
Engineering & Comp Sci
Designed to supplement the theory taught in Calculus I. problems will incorporate course work. The computational component is designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: MAT 295

ECS 116 Academic Excellence Workshop for Calculus II (1 Credit)
Engineering & Comp Sci
Designed to supplement the theory taught in Calculus II. Problems will incorporate course work. The computational component is designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: MAT 296

ECS 117 Academic Excellence Workshop for Calculus III (1 Credit)
Engineering & Comp Sci
Designed to supplement the theory taught in Calculus III. Problems will incorporate course work. The computational component is designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: MAT 397

ECS 122 Academic Excellence Workshop for Intro. to Computing (1 Credit)
Engineering & Comp Sci
Designed to supplement the material taught in Introduction to Computing. Problems will incorporate course work and are designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: CIS 151 or ECS 102

ECS 125 Survey of Engineering Problems (2-3 Credits)
Engineering & Comp Sci
Current design and research problems in engineering presented by faculty members actively working on these problems. Opportunities for student participation and individual project.

ECS 180 International Course (1-12 Credits)
Engineering & Comp Sci
Offered through SUAbroad by educational institution outside the United States. Student registers for the course at the foreign institution and is graded according to that institution's practice. SUAbroad works with the SU academic department to assign the appropriate course level, title, and grade for the student's transcript.
Repeatable

ECS 200 Selected Topics (1-6 Credits)
Engineering & Comp Sci
Exploration of topics not covered by the standard curriculum but of interest to faculty and students in a particular semester.
Repeatable 12 times for 36 credits maximum

ECS 201 Academic Excellence Workshop for Statics (1 Credit)
Engineering & Comp Sci
Designed to supplement the theory taught in the static (ECS 221) course. Design problems will incorporate course work. Limited enrollment/special permission.
Repeatable 3 times for 3 credits maximum
Coreq: ECS 221

ECS 202 Academic Excellence Workshop for Dynamics (1 Credit)
Engineering & Comp Sci
Designed to supplement the theory taught in the dynamics course (ECS 222). Design problems will incorporate course work. Limited enrollment/special permission.
Repeatable 3 times for 3 credits maximum
Coreq: ECS 222

ECS 203 Introduction to Technology (3 Credits)
Engineering & Comp Sci
Cross-listed with STS 203
Basic engineering principles behind some of today's rapidly changing technologies. The capabilities, limitations, and application of these technologies to audio and TV systems, CD players, communications' satellites, radar, computers, and the electric power system. For nonspecialists.

ECS 204 Mathematical Programming for Engineers (1 Credit)
Engineering & Comp Sci
Technical computing environment such as MATLAB; trigonometry and complex numbers; arrays and array operations; mathematical functions and applications; data analysis; selection programming; vectors; matrices and linear algebra; curve fitting and interpolation; integration and differentiation; symbolic processing.

ECS 205 Academic Excellence Workshop for Thermodynamics (1 Credit)
Engineering & Comp Sci
Designed to supplement the material taught in Thermodynamics. Problems will incorporate course work and are designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: MAE 251

ECS 206 Academic Excellence Workshop for Mass & Energy Balances (1 Credit)
Engineering & Comp Sci
Designed to supplement the material taught in Mass & Energy Balances. Problems will incorporate course work and are designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: CEN 231

ECS 207 AEW for CEN Thermodynamics (1 Credit)
Engineering & Comp Sci
Designed to supplement the theory taught in CEN Thermodynamics. Problems will incorporate course work and are designed to reinforce the understanding of concepts through a series of repetitive exercises.
Repeatable 3 times for 3 credits maximum
Coreq: CEN 252

ECS 221 Statics (3 Credits)
Engineering & Comp Sci
Fundamentals of static equilibrium. Vector algebra. Forces, moments, equivalent force systems. Free body diagrams and equilibrium problems in two and three dimensions. Analysis of structures and machines. Centroids and moments of inertia.
Prereq: PHY 211 or 215; Coreq: MAT 296
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/)

ECS 222 Dynamics (3 Credits)
Engineering & Comp Sci
Dynamics of a particle. Newton's law and D'Alembert's principle. Plane motion. Cartesian, polar, and local coordinates. Energy and momentum methods. Motion of a rigid body. Review of vector algebra and moments of inertia.
Prereq: MAT 296 and ECS 221
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/)

ECS 280 International Course (1-12 Credits)
Engineering & Comp Sci
Offered through SUAbroad by educational institution outside the United States. Student registers for the course at the foreign institution and is graded according to that institution's practice. SUAbroad works with the S.U. academic department to assign the appropriate course level, title, and grade for the student's transcript.
Repeatable

ECS 290 Independent Study (1-6 Credits)
Engineering & Comp Sci
In depth exploration of a problem or problems. Individual independent study upon a plan submitted by the student. Admission by consent of supervising instructor(s) and the department.
Repeatable

ECS 300 Selected Topics (1-6 Credits)
Engineering & Comp Sci
Exploration of a topic (to be determined) not covered by the standard curriculum but of interest to faculty and students in a particular semester.
Repeatable

ECS 301 Understanding Contemporary Technology (3 Credits)
Engineering & Comp Sci
Survey of significant areas of technology: scientific bases, operating principles, physical capabilities and performance, economic limitations, social impact. Areas include: fuel, energy, materials, pollution control, environmental modification. May be taken in either order with 302.

ECS 302 Understanding Contemporary Technology (3 Credits)
Engineering & Comp Sci
Survey of significant areas of technology: scientific bases, operating principles, physical capabilities and performance, economic limitations, social impact. Areas include: fuel, energy, materials, pollution control, environmental modification.

ECS 311 Introduction to Humanitarian Engineering (3 Credits)
Engineering & Comp Sci
Introduction to the role of engineers in humanitarian and low-resource settings. Overview of challenges commonly encountered, along with solutions relevant to various engineering fields. Consideration of sustainability, stakeholder engagement, humanitarian ethics, humility, and reflection.

ECS 325 Mechanics of Solids (3 Credits)
Engineering & Comp Sci
Theory of deformation, stress, stress resultants, transformation. Elastic and inelastic constitutive behavior. Equilibrium. Tension and torsion of bars; flexure and shear of beams; pressure vessels. Thermoelasticity. Elastic and inelastic stability. Energy methods.
Prereq: ECS 221; Coreq: MAT 397
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/)

ECS 326 Engineering Materials, Properties, and Processing (3 Credits)
Engineering & Comp Sci
Introduction to the properties and applications of engineering materials with emphasis on structure-property-processing relationships; fundamentals of structure, properties, and processing; materials selection for design; case studies of specific engineering applications.
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/)

ECS 353 Automotive Technology for Non-Engineers (3 Credits)
Engineering & Comp Sci
A study of the modern automobile, using a recent model car as a laboratory example. Description and demonstration of engines, transmissions, body, suspension, brakes, steering, safety equipment, and fuel systems. Federal Motor Vehicle Standards.

ECS 354 Green Technology and Sustainability (3 Credits)
Engineering & Comp Sci
Energy consumption, climate change and global warming. The green movement. Current and alternative energy sources. Technologies for energy generation, conversion and storage. Sustainable development. Green economy. Political, economic and social aspects of green practices. Permission of instructor.

ECS 365 Engineering Peer Mentor Forum (1 Credit)
Engineering & Comp Sci
Designed to give Peer Mentors the opportunity to discuss issues and concerns within their weekly group meetings. Peer Mentors will work as a group to discuss, analyze, and problem solve advising and first year transition issues.
Repeatable 3 times for 3 credits maximum

ECS 370 Professional Practice (0 Credits)
Engineering & Comp Sci
Full-time practical engineering or computer science work experience, with a participating employer, that is directly related to the student's field of study and is of a semester's duration. Student must be in good standing in the College of Engineering and Computer Science Cooperative Education Program.
Repeatable

ECS 371 International Professional Practice (0 Credits)
Engineering & Comp Sci
A supervised work experience in a laboratory at one of several European universities near an SU Abroad center. Offered only overseas through Syracuse University Abroad.

ECS 375 Academic Excellence Facilitator Forum (1 Credit)
Engineering & Comp Sci
Designed to give facilitators the opportunity to discuss issues and concerns within their weekly workshop. Facilitators will work as a group to discuss, analyze, and problem solve participant issues.
Repeatable 8 times for 8 credits maximum

ECS 380 International Course (1-12 Credits)
Engineering & Comp Sci
Offered through SUAbroad by educational institution outside the United States. Student registers for the course at the foreign institution and is graded according to that institution's practice. SUAbroad works with the SU academic department to assign the appropriate course level, title, and grade for the student's transcript.
Repeatable

ECS 391 Legal Aspects of Engineering and Computer Science (3 Credits)
Engineering & Comp Sci
Legal issues related to engineering and computer science are investigated using case studies, research projects, and term papers. Topics include patents, copyright, licenses, trade secrets, technology transfer, computer crime, contracts, and product liability.
Shared Competencies: Ethics and Integrity (https://coursecatalog.syracuse.edu/shared-competencies/ethics-and-integrity/); Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

ECS 392 Ethical Aspects of Engineering and Computer Science (3 Credits)
Engineering & Comp Sci
Ethical issues related to engineering and computer science, including professionalism, collective and individual moral responsibility, codes of ethics, whistle blowing, conflicts of interest, product liability, employer-employee expectations, oppression/injustice, inclusion/accessibility, and ethics issues related to cyberspace.
University Requirement Course: IDEA Requirement Eligible
Shared Competencies: Ethics and Integrity (https://coursecatalog.syracuse.edu/shared-competencies/ethics-and-integrity/)

ECS 400 Selected Topics (1-6 Credits)
Engineering & Comp Sci
Exploration of engineering and computer science topics not covered by the standard curriculum but of interest to faculty and students in a particular semester.
Repeatable

ECS 401 Spec. Projects-Soling Program (3 Credits)
Engineering & Comp Sci
Projects sponsored by the greater University community are completed by interdisciplinary teams in consultation with a faculty advisor. Open to juniors and seniors.

ECS 441 Leonardo da Vinci: Artist and Engineer (4 Credits)
Engineering & Comp Sci
Cross-listed with HOA 425
Interdisciplinary exploration of the life and work of Leonardo da Vinci (1452-1519). Supplemented by required field trip to Europe. Special application required.

ECS 470 Professional Practice (1-6 Credits)
Engineering & Comp Sci
Full-time practical engineering or computer science work experience, with a participating employer, that is directly related to the student's field of study and is of one semester's duration.
Repeatable

ECS 480 International Course (1-12 Credits)
Engineering & Comp Sci
Offered through SUAbroad by educational institution outside the United States. Student registers for the course at the foreign institution and is graded according to that institution's practice. SUAbroad works with the S.U. academic department to assign the appropriate course level, title, and grade for the student's transcript.
Repeatable

ECS 490 Independent Study (1-6 Credits)
Engineering & Comp Sci
In-depth exploration of a problem or problems. Individual independent study upon a plan submitted by the student. Admission by consent of supervising instructor or instructors and the department.
Repeatable

ECS 498 Concepts & Issues of Tech. (3 Credits)
Engineering & Comp Sci
Role of engineering in modern society. Selection of criteria. Methods of problem analysis and decision making. Case studies.

ECS 499 Honors Capstone Project (1-3 Credits)
Engineering & Comp Sci
Completion of an Honors Capstone Project under the supervision of a faculty member.
Repeatable 3 times for 3 credits maximum

ECS 500 Selected Topics (1-6 Credits)
Engineering & Comp Sci
Exploration of a topic (to be determined) not covered by the standard curriculum but of interest to faculty and students in a particular semester.
Repeatable

ECS 511 Sustainable Manufacturing (3 Credits)
Engineering & Comp Sci
Visions of sustainable manufacturing, systems approach to sustainable product development and design, manufacturing processes and systems, alternative energy systems for manufacturing, innovation and entrepreneurship opportunities. Senior standing.
Prereq: MFE 331
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/)

ECS 525 Probability for Engineers (3 Credits)
Engineering & Comp Sci
Sample spaces, events, and probabilities. Conditional probability and independence. Random variables, random vectors. Probability distributions and densities. Expectations. Moment-generating functions. Introduction to data analysis. Engineering applications.

ECS 526 Statistics for Engineers (3 Credits)
Engineering & Comp Sci
Point estimation, confidence intervals, simple hypothesis testing, nonparametric tests, curve fitting and regression, analysis of variance, factorial experiments, and engineering applications.
Prereq: ECS 525 or MAT 521

ECS 555 Virtual Design Studio for Green Building Systems (VDS-GBS) (3 Credits)
Engineering & Comp Sci
Integrative design methodology; Interactions between form, structure, and flows of energy & mass, and their impacts on building performance; Computer simulation tools for performance-based design. Exploration of green building design and technology through case studies

ECS 561 Data Centers: Infrastructure Design and Energy Efficiency (3 Credits)
Engineering & Comp Sci
Introduction to data centers and the infrastructure supporting the IT equipment. Focus on the energy efficiency aspects of various designs. Introduction of servers, storage and networking equipment that are housed in data centers. Power and cooling infrastructure that supports the IT equipment.
Repeatable 2 times for 6 credits maximum

ECS 570 Professional Practice (0 Credits)
Engineering & Comp Sci
Full-time practical engineering or computer work experience, with a participating employer, that is related to the student's field of study, and is of a semester's duration. May not be repeated.
Prereq: ECS graduate program

ECS 588 Principles of Wind Turbines (3 Credits)
Engineering & Comp Sci
Cross-listed with MAE 588, CEE 588
Aerodynamics, performance, control, and electrical aspects wind turbines.
Prereq: MAE 341