

ENGINEERING SCIENCE (ENGR)

ENGR 003, UNDERGRADUATE RESEARCH, 0 Credits

Engage in research activities appropriate to the discipline; and through the research experience, acquire skills, techniques, and knowledge relevant to the field of study. In consultation with a faculty mentor, engage in research activity, and make and execute a plan for a project.

ENGR 101, DESIGN OF COFFEE, 2 Credits

Roast coffee beans and brew and taste coffee while using engineering design to create the perfect cup of coffee using the least amount of electricity. Lec/rec.

Available via Ecampus

ENGR 111, ENGINEERING ORIENTATION I, 3 Credits

Engineering as a profession, historical development, ethics, curricula and engineering careers. Introduction to problem analysis and solution, data collection, accuracy and variability. Lec/rec.

Equivalent to: ENGR 111H

ENGR 112, INTRODUCTION TO ENGINEERING COMPUTING, 3 Credits

Systematic approaches to engineering problem solving using computers. Logical analysis, flow charting, input/output design, introductory computer programming and use of engineering software. Lec/lab/rec.

Equivalent to: ENGR 112H, ENGR 112H

Available via Ecampus

ENGR 112H, INTRODUCTION TO ENGINEERING COMPUTING, 3 Credits

Systematic approaches to engineering problem solving using computers. Logical analysis, flow charting, input/output design, introductory computer programming and use of engineering software. Lec/lab/rec.

Attributes: HNRS – Honors Course Designator

Equivalent to: ENGR 112

ENGR 199, SPECIAL TOPICS, 0-16 Credits

Graded P/N.

Equivalent to: ENGR 199H

This course is repeatable for 16 credits.

ENGR 201, ELECTRICAL FUNDAMENTALS I, 3 Credits

Analysis of linear circuits. Circuit laws and theorems. DC responses of circuits. Operational amplifier characteristics and applications. Lec/lab.

Prerequisite: (MTH 251 with C or better or MTH 251H with C or better) and (MTH 252 [C] or MTH 252H [C])

Equivalent to: ENGR 201H

Available via Ecampus

ENGR 201H, ELECTRICAL FUNDAMENTALS I, 3 Credits

Analysis of linear circuits. Circuit laws and theorems. DC responses of circuits. Operational amplifier characteristics and applications. Lec/lab.

Attributes: HNRS – Honors Course Designator

Prerequisite: (MTH 251 with C or better or MTH 251H with C or better) and (MTH 252 [C] or MTH 252H [C])

Equivalent to: ENGR 201

ENGR 202, ELECTRICAL FUNDAMENTALS II, 3 Credits

Sinusoidal steady-state analysis and phasors. Application of circuit analysis to solve single-phase and three-phase circuits including power, mutual inductance, transformers and passive filters. Lec/lab.

Prerequisite: ENGR 201 with C or better or ENGR 201H with C or better

Equivalent to: ENGR 202H

Available via Ecampus

ENGR 203, ELECTRICAL FUNDAMENTALS III, 3 Credits

Laplace transforms, Fourier series, Bode plots, and their application to circuit analysis.

Prerequisite: (ENGR 201 with C or better or ENGR 201H with C or better) and (ENGR 202 [C] or ENGR 202H [C]) and (MTH 256 [C] or MTH 256H [C])

ENGR 211, STATICS, 3 Credits

Analysis of forces induced in structures and machines by various types of loading. Lec/rec.

Prerequisite: MTH 252 with C or better or MTH 252H with C or better

Equivalent to: ENGR 211H

Available via Ecampus

ENGR 211H, STATICS, 3 Credits

Analysis of forces induced in structures and machines by various types of loading. Lec/rec.

Attributes: HNRS – Honors Course Designator

Prerequisite: MTH 252 with C or better or MTH 252H with C or better

Equivalent to: ENGR 211

ENGR 212, DYNAMICS, 3 Credits

Kinematics, Newton's laws of motion, and work-energy and impulse-momentum relationships applied to engineering systems. Lec/rec.

Prerequisite: (ENGR 211 with C or better or ENGR 211H with C or better) and (PH 211 [C] or PH 211H [C])

Equivalent to: ENGR 212H

Available via Ecampus

ENGR 212H, DYNAMICS, 3 Credits

Kinematics, Newton's laws of motion, and work-energy and impulse-momentum relationships applied to engineering systems. Lec/rec.

Attributes: HNRS – Honors Course Designator

Prerequisite: (ENGR 211 with C or better or ENGR 211H with C or better) and (PH 211 [C] or PH 211H [C])

Equivalent to: ENGR 212

ENGR 213, STRENGTH OF MATERIALS, 3 Credits

Properties of structural materials; analysis of stress and deformation in axially loaded members, circular shafts, and beams, and in statically indeterminate systems containing these components. Lec/rec.

Prerequisite: ENGR 211 with C or better or ENGR 211H with C or better

Equivalent to: ENGR 213H

Available via Ecampus

ENGR 213H, STRENGTH OF MATERIALS, 3 Credits

Properties of structural materials; analysis of stress and deformation in axially loaded members, circular shafts, and beams, and in statically indeterminate systems containing these components. Lec/rec.

Attributes: HNRS – Honors Course Designator

Prerequisite: ENGR 211 with C or better or ENGR 211H with C or better

Equivalent to: ENGR 213

ENGR 221, THE SCIENCE, ENGINEERING AND SOCIAL IMPACT OF NANOTECHNOLOGY, 3 Credits

Nanotechnology is an emerging engineering field that manipulates atoms and molecules to fabricate new materials and tiny devices. Properties of nanostructured materials, manufacturing methods, characterization methods, and impact on health and safety. Benefits and concerns about nanotechnology will be assessed. Lec/rec. CROSSLISTED as ENG 221/MATS 221.

Equivalent to: MATS 221

Recommended: One year of college science.

ENGR 248, ENGINEERING GRAPHICS AND 3-D MODELING, 3 Credits

Introduction to graphical communication theory, including freehand sketching techniques, geometric construction, multi-view, pictorial, sectional and auxiliary view representation and dimensioning techniques. Practical application of theoretical concepts using solid modeling software to capture design intent and generate engineering drawings. Lec/Lab.

Available via Ecampus

ENGR 299, SPECIAL TOPICS, 0-16 Credits

Equivalent to: ENGR 299H

This course is repeatable for 16 credits.

ENGR 299H, SPECIAL TOPICS, 0-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: ENGR 299

This course is repeatable for 16 credits.

ENGR 350, *SUSTAINABLE ENGINEERING, 3 Credits

Examination of technological innovations and alternatives required to maintain human quality of life and environmental sustainability. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society

Equivalent to: ENGR 350H

Available via Ecampus

ENGR 350H, *SUSTAINABLE ENGINEERING, 3 Credits

Examination of technological innovations and alternatives required to maintain human quality of life and environmental sustainability. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society; HNRS – Honors Course Designator

Equivalent to: ENGR 350

ENGR 352, *CREATIVE COLLABORATION: DESIGNING AND BUILDING, 3 Credits

Working in multi-disciplinary teams, design, implement, and document a piece of public art work or science museum display. Projects may be made of any media, but must demonstrate creativity both in the engineering used to create them and the technology and society message they convey. CROSSLISTED as ART 352/ENGR 352. (Bacc Core Course)

Attributes: CPLA – Core, Pers, Lit and Arts

Equivalent to: ART 352

ENGR 363, *ENERGY MATTERS, 3 Credits

Establishes a basic energy vocabulary, applies the fundamental concepts of identifying energy use and determining efficiency, and studies the implications of energy decisions in the context of traditional, alternative, and sustainable energy resources. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society

Equivalent to: ENGR 363H

Recommended: MTH 112 or higher

ENGR 363H, *ENERGY MATTERS, 3 Credits

Establishes a basic energy vocabulary, applies the fundamental concepts of identifying energy and determining efficiency, and studies the implications of energy decisions in the context of traditional, alternative, and sustainable energy resources. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society; HNRS – Honors Course Designator

Equivalent to: ENGR 363

Recommended: MTH 112 or higher

ENGR 390, ENGINEERING ECONOMY, 3 Credits

Time value of money; economic study techniques, depreciation, taxes, retirement, and replacement of engineering facilities.

Available via Ecampus

ENGR 391, ENGINEERING ECONOMICS AND PROJECT MANAGEMENT, 3 Credits

Critical issues in the management of engineering and high-technology projects are discussed. Economic, time, and performance parameters of engineering projects are analyzed from the organizational and resource perspectives. Network optimization and simulation concepts are introduced. Fundamental engineering economics concepts are introduced and applied to planning and managing projects.

Equivalent to: ENGR 391H

Available via Ecampus

ENGR 391H, ENGINEERING ECONOMICS AND PROJECT MANAGEMENT, 3 Credits

Critical issues in the management of engineering and high-technology projects are discussed. Economic, time, and performance parameters of engineering projects are analyzed from the organizational and resource perspectives. Network optimization and simulation concepts are introduced. Fundamental engineering economics concepts are introduced and applied to planning and managing projects.

Attributes: HNRS – Honors Course Designator

Equivalent to: ENGR 391

ENGR 399, SPECIAL TOPICS, 1-16 Credits

Equivalent to: ENGR 399H

This course is repeatable for 16 credits.

Available via Ecampus

ENGR 399H, SPECIAL TOPICS, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: ENGR 399

This course is repeatable for 16 credits.

ENGR 407, SEMINAR, 1-16 Credits

Graded P/N.

Equivalent to: ENGR 407H

This course is repeatable for 16 credits.

ENGR 407H, SEMINAR, 1-16 Credits

Graded P/N.

Attributes: HNRS – Honors Course Designator

Equivalent to: ENGR 407

This course is repeatable for 16 credits.

ENGR 415, ^ENGINEERING CAPSTONE DESIGN I, 4 Credits

Utilizes engineering methodologies in a team environment to develop real-world solutions to an engineering problem. Develops all phases of system development, including project planning, requirements analysis, design, testing, configuration management, quality assurance, documentation, and delivery. First course/term of a two term design project.

Attributes: CWIC – Core, Skills, WIC

ENGR 416, ^ENGINEERING CAPSTONE DESIGN II, 4 Credits

Utilizes engineering methodologies in a team environment to develop real-world solutions to an engineering problem. Teams will be responsible for all phases of system development, including project planning, requirements analysis, design, testing, configuration management, quality assurance, documentation, and delivery. Second course/term of a two term design project.

Attributes: CWIC – Core, Skills, WIC

Prerequisite: ENGR 415 with C- or better

ENGR 450, PROFESSIONAL PREPARATION FOR BEGINNING LEVEL ENGINEERS, 1 Credit

Practical training on professional skills essential for a career as a practicing engineer. Covers development of networking and interviewing skills, preparation of a resume, job search strategies and guidance on future professional development.

ENGR 499, SPECIAL TOPICS, 1-16 Credits

Equivalent to: ENGR 499H

This course is repeatable for 16 credits.

ENGR 499H, SPECIAL TOPICS, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: ENGR 499

This course is repeatable for 16 credits.

ENGR 520, MENG INTRODUCTION TO PORTFOLIO, 1 Credit

Explores OSU resources, Graduate School, and College of Engineering requirements to prepare for work on an MEng final portfolio. Engages in writing skills necessary to complete the final portfolio. Investigates communication styles, Imposter Syndrome, understanding and coping mechanisms, and professional ethics as they relate to an MEng final portfolio.

ENGR 521, MENG PORTFOLIO COMPLETION, 1 Credit

Demonstrate how graduate learning outcomes have been met. Formulate clear and reasonable professional goals and articulate how the program has helped prepare for achievement of those goals. Create a final portfolio document summarizing core knowledge and its integration with other fields.

Prerequisite: ENGR 520 with C or better

ENGR 531, APPLIED IMAGING AND IMAGE PROCESSING, 3 Credits

Explore image formats, storage issues, characteristics and significance of histograms; define and explain image artifacts such as random and periodic noise. Implement different image processing operations such as filters, registration, and mathematical algorithms to enhance an image and facilitate subsequent segmentation such as histogram thresholding, cluster analysis, watershed analysis, etc. Make quantitative measurements from images, such as length, area, orientation, connectivity, anisotropy, and perimeter of objects, as well as porosities, surface areas and curvatures. Apply advanced image analysis via skeletonization, morphological/ topological analysis, surface generation/ triangulation etc.

This course is repeatable for 3 credits.

Recommended: Introductory preparation in mathematical analysis, vectors, matrices, probability, statistics, linear systems, and computer programming

ENGR 550, PROFESSIONAL PREPARATION FOR ENGINEERS, 1 Credit

Practical training on professional skills essential for a career as a practicing engineer. Covers development of networking and interviewing skills, preparation of a resume and related online media, and guidance on future professional development. As this is a graduate-level course, it will include guidance on how students can develop and present themselves in ways that differentiate their abilities from those of more junior engineers.

Available via Ecampus

ENGR 555, FOUNDATIONS OF ENGINEERING EDUCATION RESEARCH AND PRACTICE, 3 Credits

An examination as to why engineering education is practiced and researched the way that it is through reading, discussion and writing. The focus of the course will be on written and verbal interactions informed by careful reading of assigned texts.

ENGR 599, SPECIAL TOPICS, 1-16 Credits

This course is repeatable for 16 credits.