

INDUSTRIAL & SYSTEMS ENGINEERING (ISE)

ISE 139 - Foundations of Academic Discovery

Foundations of Academic Discovery serves as the entry point to the Rock Integrated Studies Program. With its strong faculty-student interaction, the course promotes intellectual inquiry, critical and creative thinking, and computer skills needed for academic success. Through varied content, the course introduces students to academic discourse and information literacy while exploring topics such as diversity and inclusion and global awareness. This course will set students along the path to becoming engaged with issues and scholarship important to a 21st century education while they learn about themselves and their place in the world.

Credits: 3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with the ROCK STUDIES 2 STUDENT or ROCK STUDIES STUDENT attributes.

ISE 190 - Experimental

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

ISE 198 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

ISE 290 - Experimental

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

ISE 298 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

ISE 311 - Introduction to Operations Research

Topics include deterministic methods in operations research. Linear programming, duality, integer programming, dynamic programming, nonlinear programming, inventory theory, transportation and assignment and network theory.

Prerequisites: MATH 231^C or MATH 240^C or (MATH 122^C and MATH 230^C)

^C Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 330 - Six Sigma Methodology

Statistical methods of Six Sigma used for efficient new product development as well as methods for process improvement. The math and methodology of six Sigma including DMAIC and DMADV processes. Topics will include measurement and analysis mathematical techniques. Design of experiment will be introduced. Case studies will be used to illustrate advanced concepts of Six Sigma.

Prerequisite: STAT 350^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 362 - Lean Systems

The design and delivery of services. Topics include how to design and improve service offerings for sustained excellence, how to identify and overcome challenges in service delivery. Both traditional services as well as e-commerce service will be studied for both the private and public sector.

Prerequisite: ISE 330 (may be taken concurrently)^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 370 - Design of Industrial Systems and Processes

This course covers advanced topics in Applied Engineering Statistics. It includes the introduction to linear regression analysis, simple linear models, multiple linear models, residual analysis, indicator variables, variable selection process, ANOVA, introduction to design of Industrial systems and processes, basic designs, factorial designs, fractional factorial designs, blocking, Taguchi designs, and response surface methodology. Extensive use of statistical software will be introduced throughout the course.

Prerequisite: STAT 350^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 372 - Manufacturing Systems Design and Analysis

Contemporary techniques used to design and analyze manufacturing systems for economic manufacture of products. Design of manufacturing systems (human and automated) to satisfy differing types of product demand will be explored.

Prerequisite: ENGR 340^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 373 - Quality Engineering

A comprehensive coverage of modern quality control techniques including the design of statistical process control systems, acceptance sampling and process improvement.

Prerequisites: MATH 230^D and (STAT 252^D or STAT 350^D)

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 382 - Sustainable Processes

Exploration of the scientific and legal progress in sustainability. Students will learn both the theory of sustainability as well as how sustainable processes can be implemented throughout an organization.

Prerequisites: PHYS 217^D and MATH 230^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 390 - Experimental

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 398 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 402 - Work Design

Introductory tools required for analyzing and designing both the job and the worksite in a cost-effective manner, as well as measuring the resulting output. These tools include human information processing, basic auditory and visual displays, anthropometry and musculoskeletal principles, cumulative trauma disorders, work measurement and stopwatch time study. Students taking this course should be familiar with the basic concepts of cost.

Prerequisite: ISE 372 (may be taken concurrently)^C

^C Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 410 - Engineering Project Management

This course is an introduction to the concepts and practices of project management. It provides students with a basic exposure to the tasks and challenges facing today's engineering projects and in particular, those of the project manager. This course also provides students with the quantitative tools for the successful management of engineering projects. The problems of selecting projects, initiating projects, and operating and controlling projects will be discussed in this course.

Prerequisite: ENGR 340^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 420 - Simulation of Industrial Systems

In this course, the student will develop an understanding and need for discrete event simulation in practice. The course will focus on basic and advanced concepts in simulation modeling including analyzing simulation results, and successfully developing simulation models useful in production/manufacturing, supply chains, transportation, and other areas related to industrial and Manufacturing Engineering. Simulation package such as ARENA will be integrated and used throughout.

Prerequisites: (MATH 311^D or ISE 311^D) and STAT 350^D

^D Requires minimum grade of D.

Credits: 4

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 421 - Supply Chain & Logistics Engineering

Overview of key logistics and supply chain management processes, concepts and methodologies. Emphasis is given to the Lean development of supply chain management, the analysis of logistics cost and service trade-offs among inventory transportation and warehousing activities, the strategic role of information technology in supply chains, the use of third-party logistics providers, and the methods of measuring the value of logistics performance. Instruction may include problem-based learning pedagogy.

Prerequisites: ISE 311 (may be taken concurrently)^D and ISE 373^{*D} (may be taken concurrently).

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 430 - Production Planning & Control

This course equips students with knowledge of fundamental issues in production and inventory planning and control while developing the students' modeling and analytical skills. This course emphasizes the application of industrial engineering theory and practice to the area of operations management and production planning/control. This course will cover analysis and understanding of forecasting, aggregate planning, operations strategy, capacity planning, supply-chain management, just-in-time systems, lean manufacturing, agile manufacturing, materials replacement planning, inventory management, and scheduling and sequencing.

Prerequisites: ENGR 340^D and ISE 372^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 432 - Productivity Analysis

Techniques for measuring and assessing productivity for output, labor, capital and input. Aggregation of productivity growth will also be discussed.

Prerequisite: MATH 231^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 440 - Health Care Systems Engineering

The course examines the technical structure of the healthcare delivery system and the role that industrial engineering (IE) plays in its design and improvement. Included will be how healthcare systems work in hospitals, medical offices, clinics and other healthcare organizations. Traditional IE methods for improving quality, patient safety, and employee productivity and satisfaction will be present within a systematic application of value chain engineering designed to produce lean processes.

Prerequisites: ISE 311^D and ISE 373^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 442 - Human Factors Engineering

An analytic study of human factors that need to be taken into account in the design and engineering of complex workplace systems. Body mechanics will be used to understand the needs of humans in the workplace under a variety of different constraints: physical demands, environmental conditions, human capability. system design considerations aimed at reducing safety hazards will be studied.

Prerequisite: ISE 402^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 460 - Engineering Risk Analysis

This course is an introduction to risk, risk assessment, and risk management in engineering systems. It focuses on building mathematical models to assess and quantify risk principally by following the methodologies of probabilistic risk analysis. In particular, the course covers concepts of risk analysis, risks in engineered systems; methods of risk analysis, fault trees and event trees; quantification of probabilities, use of data, models, and expert judgments; risks and decisions, interlinking risk analysis with risk management; applications to cybersecurity.

Prerequisite: STAT 350^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 480 - Industrial and Systems Engineering Undergraduate Research

Research and design problems of limited scope approved on an individual basis intended to promote independent study; results of study presented in writing.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with a semester level of Junior 1, Junior 2, Senior 1 or Senior 2.

ISE 487 - Industrial and Systems Engineering Senior Project I

This course provides a proposal preparation for ISE 488 which includes defining a comprehensive problem in design involving systems in manufacturing, service, and other systems to improve efficiency and quality, and optimize the resources utilization.

Prerequisites: ISE 370^D and ISE 420^D and ISE 421^D

^D Requires minimum grade of D.

Credits: 1

Term(s) Typically Offered: Offered Fall Terms

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 488 - Senior Project II

Senior project in industrial and systems engineering. Requires students to complete a multi-dimensional project in their area of interest: industry, health-care, etc. The project must be approved by ISE faculty no later than the end of the fourth week of the start of the course. Students will be invited to propose their own projects or create one in collaboration with ISE faculty.

Prerequisite: ISE 487^D

^D Requires minimum grade of D.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Enrollment limited to students with a semester level of Senior 1 or Senior 2.

ISE 490 - Independent Study

Independent Study courses give students the opportunity to pursue research and/or studies that are not part of the university's traditional course offerings. Students work one on one or in small groups with faculty guidance and are typically required to submit a final paper or project as determined by the supervising professor.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

ISE 498 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.