

# INTERDISCIPLINARY COURSES (ENGINEERING) (INTEREGR)

## INTEREGR 102 – INTRODUCTION TO SOCIETY'S ENGINEERING GRAND CHALLENGES

2 credits.

Description and discussion of how engineering disciplines address specific engineering grand challenges in society. Focus on societal and multicultural issues encountered in engineering, as well as economic, ethical and political constraints on engineering solutions. Development of students' professional skills.

**Requisites:** None

**Repeatable for Credit:** No

**Last Taught:** Spring 2016

## INTEREGR 110 – INTRODUCTION TO ENGINEERING

1 credit.

For first-year students in the College of Engineering. Introduction to engineering disciplines and professional fields; engineering design process; grand challenges; sustainability, societal, multicultural and global issues encountered in engineering; economic and ethical constraints on engineering solutions; and employment and educational opportunities in engineering.

**Requisites:** None

**Repeatable for Credit:** No

**Last Taught:** Spring 2018

## INTEREGR 111 – INTRODUCTION TO THE ENGINEERING DESIGN PROCESS AND PROFESSION

2 credits.

Introduction to the engineering design process and profession through applied problem-solving. Emphasis on the engineering design process in industry, teamwork and communication skills; the engineer's responsibilities to customers and society; and the role of engineers in improving the human condition.

**Requisites:** None

**Repeatable for Credit:** No

**Last Taught:** Fall 2015

## INTEREGR 130 – INTRODUCTION TO MECHANICS AND APPLICATIONS IN ENGINEERING

1 credit.

Introduction to mechanics and applications in engineering, including introduction to free body diagrams, spatial awareness, and how to use vectors in engineering applications.

**Requisites:** Consent of instructor

**Repeatable for Credit:** No

**Learning Outcomes:** 1. Correctly use basic mathematics concepts that are applied to introductory mechanics and connect math to conceptual physical understanding Audience: Undergraduate

2. Practice 3D spatial awareness/reasoning Audience: Undergraduate

3. Apply problem-solving strategies to physical problems, including evaluating engineering problem solving approaches. Audience: Undergraduate

4. Demonstrate group problem solving skills through assessment of peers' ideas and work, discussion of alternate approaches, and explanation of solutions Audience: Undergraduate

5. Effectively communicate problem solving processes and results through writing and diagrams. Audience: Undergraduate

## INTEREGR 140 – SUCCESS IN ENGINEERING ACADEMICS

1 credit.

Learn and practice evidence-based strategies for success as an engineering student. Topics include study skills, time management, career exploration, academic writing, academic reading comprehension, motivation and self-directed learning.

**Requisites:** None

**Repeatable for Credit:** No

**Learning Outcomes:** 1. Practice evidence based learning strategies (such as elaboration, recall, spaced practice) Audience: Undergraduate

2. Develop and implement time-management techniques Audience: Undergraduate

3. Practice problem solving strategies Audience: Undergraduate

4. Identify the tools for being a successful engineering student Audience: Undergraduate

## INTEREGR 150 – DIRECTED STUDIES IN ENGINEERING FOUNDATION COURSES

0 credits.

Directed study through College of Engineering Supplementary Instruction program. Group discussion and problem-solving coaching to enhance understanding of physics and its applications to engineering.

**Requisites:** None

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2024

**INTEREGR 160 – INTRODUCTION TO ENGINEERING DESIGN**

3 credits.

This course provides the incoming freshman with an overview of engineering based on a "hands-on" experience with a client-centered engineering design project, which includes: 1) a team-based design project, 2) a survey of engineering disciplines, and 3) an introduction to computer tools and lab techniques.

**Requisites:** None**Repeatable for Credit:** No**Last Taught:** Spring 2016**INTEREGR 170 – DESIGN PRACTICUM**

3 credits.

Introduction to design via the invention, fabrication and testing of a device that solves a problem proposed by a real world client. Information retrieval techniques, specification writing, methods for enhancing creativity, analysis techniques, scheduling, selection methodologies, cost estimating, sustainability in design, shop safety, engineering ethics, opportunities for engineering students (ie, study abroad, internships, co-ops), major exploration, fabrication equipment and techniques, and oral and written communication.

**Requisites:** None**Repeatable for Credit:** No**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Learn the fundamentals of the engineering design process and then apply them in a laboratory setting by working on a novel, client-based, hands-on engineering challenge. \n Audience: Undergraduate

10. Major exploration and self reflection Audience: Undergraduate

11. Learn pertinent information to maximize success as an engineering student\n Audience: Undergraduate

2. Develop individual learning and cooperative teamwork skills through conduct of independent research and collaborative problem solving in a team setting. \n Audience: Undergraduate

3. Promote diversity and inclusiveness through exercises designed to create multicultural awareness of, and respect for, individual differences in experience, learning style, and academic interests. \n Audience: Undergraduate

4. Effect professional development through team-building activities, practice in personal and professional communication, leadership, project management, and engineering ethics.\n Audience: Undergraduate

5. Utilize academic research, creativity, innovation, fabrication, testing, and design iteration to develop effective decision-making and problem-solving skills.\n Audience: Undergraduate

6. Practice effective technical communication skills through maintaining a design notebook, giving oral presentations, and writing a technical report. \n Audience: Undergraduate

7. Participate in COE shop training to obtain the basic skills required for prototype fabrication and as a prerequisite for more advanced training in subsequent design courses. \n Audience: Undergraduate

8. Develop professional teaching and leadership skills in junior and senior engineering student assistants through peer-mentoring and training activities during the course.\n Audience: Undergraduate

9. Define engineering and learn the fundamentals of the engineering design process\n Audience: Undergraduate

**INTEREGR 303 – APPLIED LEADERSHIP COMPETENCIES IN ENGINEERING**

3 credits.

Introduction to basic leadership theories and perspectives; application of said theories to real-life experiences (both engineering and otherwise) through reflections, course discussion, readings, and experiential education in their local communities. Social Change Model of Leadership Development and Servant Leadership theory, viewed through an Applied Critical Leadership Theory lens.

**Requisites:** None**Repeatable for Credit:** No**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Identify the leadership role that engineering professionals play in service to a breadth of social, political, environmental, economic, and global issues Audience: Undergraduate

2. Apply and reflect on the “Seven C’s” of the Social Change Model through engaging as servant leaders in a stewardship service project Audience: Undergraduate

3. Apply teamwork and leadership skills necessary to embrace individual differences and help groups collaborate on shared aims and values Audience: Undergraduate

4. Identify and describe one’s own individual strengths, and be able to identify and honor the strengths in others Audience: Undergraduate

5. Communicate comfortably and professionally with peers, practicing engineers, and adult professionals Audience: Undergraduate

6. Reflect upon and understand one’s own responsibility to strive for self-awareness, empathy, authenticity, vulnerability, and curiosity when working on leadership skill attainment Audience: Undergraduate

7. Utilize a critical race perspective to address leadership challenges found in personal and professional experiences to achieve change in response to power, domination, access, and achievement imbalances Audience: Undergraduate

**INTEREGR 397 – ENGINEERING COMMUNICATION**

3 credits.

Communication for engineering, science, and technology; theory and practice in planning, preparing, and critiquing reports, proposals, and workplace correspondence; persuasive argumentation, ethical decision-making strategies, multidisciplinary communication skills, research strategies, collaborative work; oral presentations.

**Requisites:** Satisfied Communications A requirement and junior or senior standing only**Course Designation:** Gen Ed – Communication Part B**Repeatable for Credit:** No**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Identify a focused technical project, then research, organize, draft, apply feedback, develop, and revise technical writing and presentations for a multidisciplinary, professional audience Audience: Undergraduate

2. Retrieve, identify, and analyze credible research that can help develop and inform a technical problem Audience: Undergraduate

3. Identify and describe contexts for engineering projects that address relevant social, ethical, environmental, economic, and political impacts Audience: Undergraduate

4. Apply moral theories and professional codes to effectively analyze problems in engineering ethics and arrive at defensible actions Audience: Undergraduate

5. Contribute to a team through creating a collaborative and inclusive environment, establishing goals, planning tasks, and meeting objectives Audience: Undergraduate

**INTEREGR 413 – CURRENT ISSUES IN INTERNATIONAL ENGINEERING**

1 credit.

Provides a comparative examination and analysis of global trends and regional variations for engineering concepts, standards and practices. Using organizational case studies, the course will describe and analyze multi-national engineering operations and summarize best practices and caveats.

**Requisites:** Declared in International Engineering Certificate**Repeatable for Credit:** No**Last Taught:** Fall 2023

**INTEREGR 477 – TOOLS FOR PROTOTYPING AND MANUFACTURING**

1-3 credits.

Tools for prototyping and manufacturing physical objects along with some of the underlying theory for how the tools work. Tools include 3D printers, 3D scanners, thermoformers, CNC routers, welders, wood saws, mills, lathes, laser cutters, waterjets, machine tools, general electronics, microcontrollers and Virtual Reality.

**Requisites:** None**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Fall 2023**Learning Outcomes:** 1. Implement prototyping as a design methodology that incorporates making, critical reflection, and iteration. Audience: Both Grad Undergrad

2. Use rapid prototyping and machining equipment and techniques safely. Audience: Both Grad Undergrad

3. Employ a set of prototyping techniques and approaches for concept development. Audience: Both Grad Undergrad

4. Work independently and collaboratively to generate a portfolio of hands-on projects using the various tools. Audience: Both Grad Undergrad

5. Apply engineering principles and equipment theory to troubleshoot while operating equipment. Audience: Both Grad Undergrad

6. Describe the current roles of the rapid prototyping and machining techniques in industry and research. Audience: Graduate

**INTEREGR 601 – TOPICS IN INTERDISCIPLINARY ENGINEERING**

1-3 credits.

Interdisciplinary topics of special interest to undergrad and grad students in engineering.

**Requisites:** None**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2024**INTEREGR 941 – COLLABORATIVE CAPSTONE II**

3 credits.

Explore chosen opportunity area through prototyping, user testing, and iteration. Creation of final, high resolution design, with communication and launch plan for startup, product or service. Practice behaviors of design thinking - ethics, critique, and storytelling.

**Requisites:** INTER-HE 940**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2024**Learning Outcomes:** 1. Apply an iterative design thinking process on an interdisciplinary team. Audience: Graduate

2. Generate creative ideas through structured brainstorming sessions. Audience: Graduate

3. Develop and fabricate rapid prototypes using a wide range of techniques (physical, digital, etc.) to bring their ideas into reality as quickly as possible and obtain feedback. Audience: Graduate

4. Deliver a clear, thoughtful design with evidence showing it is desirable, feasible, and viable. Audience: Graduate

5. Communicate effectively, both visually and orally. Audience: Graduate

6. Demonstrate constructive collaboration behaviors— creative critique, balancing independent work with group work, and knowing when to get an outside opinion. Audience: Graduate