MULTI-DISCIPLINARY STUDIES (MDS)

MDS 100 - Me, Myself, and Leadership 1 Credit

Hours: 1R-1L-1C
Term Available: W,S
Graduate Studies Eligible: No
Prerequisites: None

Before leading others, you must first understand yourself. This course will focus on developing YOU as a leader through hands-on experiences, lectures, and reflection. Focus will be on learning about your personality, identity, values, and strengths and how those relate to your growth as a leader. In addition, you will explore how a solid understanding of emotional and social intelligence can help a leader motivate and communicate with their team. Leadership is a process, not a position; you can learn to be a leader.

MDS 150 - Leading Together 1 Credit

Hours: 1R-1L-1C
Term Available: F,W
Graduate Studies Eligible: No
Prerequisites: MDS 100

Leading a successful team is more than just working toward a common goal. It takes skill and practice to be a great leader. This course will focus on developing you as a leader of cohesive and effective teams through hands-on experiences and reflections. The focus will be on learning how to motivate and lead a team with members that have a variety of strengths, skills, backgrounds, and values.

MDS 201 - Global Engineering and the Social Context 2 Credits

Hours: 1R-3L-2C
Term Available: S
Graduate Studies Eligible: No
Prerequisites: None

Examines the practice of engineering in a global context. Discusses the nature of global challenges and the context in which those global challenges need to be solved by covering such topics as culture, participant observation, field notes, national character, standards, codes and regulations, community engagement engineering, sustainable engineering, engineering ethics, intercultural communication as well as flexible and adaptable problem solving.

MDS 202 - Global Engineering and the Social Context 2 Credits

Hours: 0R-6L-2C
Term Available: S
Graduate Studies Eligible: No
Prerequisites: MDS 201

Examines engineering as practiced in an immersive global context. Contextualizes the design method, standards, codes and regulations by completing an engineering project in the travel country.Explores the impact of the travel country's cultural, political, geographical and social attributes on the practice of engineering. Students enrolled in this course must complete an approved international travel program.

MDS 210 - Introduction to Internet of Things 4 Credits

Hours: 4R-0L-4C
Term Available: See Department
Graduate Studies Eligible: No
Prerequisites: None

Introduction to the design and development of an Internet of Things (IoT) solution. Provides breadth of knowledge on a broad range of topics, such as sensors, power, communication, cloud storage, data analysis, automation, privacy and security, business considerations, and ethics. Focuses on a multidisciplinary team design project to provide a complete IoT solution for a real-world application. This is a required course for the minor in Internet of Things for all majors except those earning a primary or secondary major in EE, CPE, CS, and SE. Students cannot earn credit for both MDS210 and ECE436.

MDS 220 - Introduction to Research Fundamentals 1 Credit

Hours: 1R-0L-1C
Term Available: F
Graduate Studies Eligible: No
Prerequisites: None

This course focuses on skills required for beginning an undergraduate research project, including formulating research questions, reading the primary literature, documentation practices, research ethics, and professional development.

MDS 221 - Conducting and Communicating Research 1 Credit

Hours: 1R-0L-1C
Term Available: W
Graduate Studies Eligible: No
Prerequisites: MDS 220

The course is designed for current undergraduate researchers and focuses on skills for successfully conducting research and communicating results. Topics include setting project goals and expectations, preparing research proposals, and research communication (oral, written, visual).

MDS 230 - Introduction to Renewable Energy 4 Credits

Hours: 4R-0L-4C
Term Available: See Department
Graduate Studies Eligible: No
Prerequisites: PH 112

Introduces concepts necessary to evaluate current and alternative energy sources. It will cover topics of 3-phase electrical power production and transmission, basics of converting heat to work through thermodynamic cycles, levelized cost of energy as a metric of performance/comparison, and comparisons of the advantages and disadvantages of traditional and renewable energy power plants (including wind, hydroelectric, photovoltaic, solar-thermal, geothermal, and others as time permits) focusing on industry trends and technical challenges. This class will prepare students to study more advanced topics in the field of renewable energy

MDS 290 - Special Topics in Multidisciplinary Studies 1-4 Credits

Hours: (1 - 4)R-0L-(1 - 4)C
Term Available: F,W,S
Graduate Studies Eligible: No
Prerequisites: None

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 301 - Global Engineering for Health 4 Credits

Hours: 4R-0L-4C
Term Available: F,W,S
Graduate Studies Eligible: No
Prerequisites: PH 112

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 302 - Sustainability in Practice 2 Credits

Hours: 2R-0L-2C
Term Available: F,W,S
Graduate Studies Eligible: No
Prerequisites: (HUM H130 and BIO 191 and ECON S151) or (GS 130 and BIO 191 and (SV 150 or SV 151))

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 310 - Appropriate Technology for Developing Communities 4 Credits

Hours: 4R-0L-4C
Term Available: F
Graduate Studies Eligible: No
Prerequisites: MA 113 and PH 112

Prepares students to effectively participate in humanitarian engineering work in developing communities. Introduces multidisciplinary technical topics important in areas with limited infrastructure such as water and sanitation, agriculture, energy, and communication. Emphasis on cross-cultural communication, community support and involvement, long-term maintenance, and minimizing harmful side-effects. Team design project to demonstrate a practical and appropriate system from the course material.

MDS 390 - Special Topics in Multidisciplinary Studies 1-4 Credits

Hours: (1 - 4)R-0L-(1 - 4)C
Term Available: F,W,S
Graduate Studies Eligible: No
Prerequisites: None

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 401 - Independent Project/Research Opportunities Seminar 1 Credit

Hours: 1R-0L-1C
Term Available: F,W,S
Graduate Studies Eligible: No
Prerequisites: None

Companion seminar for students participating in the Independent Project/Research Opportunities Program. Students attend an organizational seminar, attend one additional IPROP seminar during the quarter, complete first week and tenth week surveys, acknowledge their sponsor, and generate publicity graphics. Students present their work as a poster at a tenth week End of Quarter Symposium. This course may not be used as credit toward any degree program. This course is given Pass/Fail.

MDS 402 - Seminar in Sustainability 2 Credits

Hours: 2R-0L-2C
Term Available: F,W,S
Graduate Studies Eligible: No
Prerequisites: None

This course provides students with the opportunity to examine, analyze, and reflect upon sustainability as it related to their project or research work. Course work includes weekly readings and discussions, individual essays, and in-class and public presentations. Successful completion of this course will require students to have completed the co-curricular requirements.

MDS 410 - Multidisciplinary Capstone I 4 Credits

Hours: 2R-3L-4C
Term Available: F
Graduate Studies Eligible: No
Prerequisites: None

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 420 - Multidisciplinary Capstone II 4 Credits

Hours: 2R-3L-4C
Term Available: W
Graduate Studies Eligible: No
Prerequisites: MDS 410

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 430 - Multidisciplinary Capstone III 4 Credits

Hours: 2R-3L-4C
Term Available: S
Graduate Studies Eligible: No
Prerequisites: MDS 420

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 437 - Introduction to MEMs: Fabrication & Applications 4 Credits

Hours: 3R-3L-4C
Term Available: S
Graduate Studies Eligible: Yes
Prerequisites: None

Properties of silicon wafers, wafer-level processes, vacuum systems, thin film deposition via PVD, dry and wet etching, photolithography, surface and bulk micromachining, process integration, simple actuators. MEMS applications: heat actuators, capacitive accelerometer, cantilever, and pressure sensor. The laboratory consists of cleanroom-based MEMS fabrication and testing activities.

MDS 439 - Advanced topics in MEMS 4 Credits

Hours: 3R-3L-4C
Term Available: W
Graduate Studies Eligible: Yes
Prerequisites: MDS 437 or MDS 537

Topics such as: Microlithography, design process, modeling: analytical and numerical. Use of software for layout design and device simulation. Actuator dynamics and thermal issues. Characterization and reliability of MEMS devices. Electrical interfacing and packaging of MEMS. Microsensors, microfluidic systems, and applications in engineering, biomedicine, and chemistry. The laboratory consists of cleanroom-based MEMS design, fabrication, and testing activities.

MDS 440 - Systems Engineering Capstone 2 Credits

Hours: 2R-0L-2C
Term Available: F
Graduate Studies Eligible: No
Prerequisites: None

Directed study course with a minor advisor. Student applies concepts from SE courses to an experience in their undergraduate career. Taken in senior year. Culminates in a written report at the end of the quarter. Must attend and report on one monthly INCOSE meeting with practicing systems engineers. Only available to those students who have officially declared their intent to earn the SE Minor.

MDS 442 - Applied Computational Modeling 2 Credits

Hours: 0R-2L-2C
Term Available: S
Graduate Studies Eligible: No
Prerequisites: None

Numerical modeling of scientific and engineering problems as practiced by computational scientists. Students will develop, implement, refine, and apply computational models to simulate physical phenomena.

MDS 450 - Consulting Engineering Seminar 2 Credits

Hours: 2R-0L-2C
Term Available: S
Graduate Studies Eligible: Yes
Prerequisites: None

Discusses problems in the field of consulting engineering; includes seminars presented by practicing consulting engineers and project work to practice consulting skills.

MDS 490 - Special Topics in Multidisciplinary Studies 1-4 Credits

Hours: (1 - 4)R-0L-(1 - 4)C
Term Available: F,W,S
Graduate Studies Eligible: No
Prerequisites: None

This is a project-based course to provide hands-on experiences for student teams working on real-world problems related to sustainability. This could include design projects, scientific research, modeling-based projects, or studies to improve campus sustainability. The course instructor will mentor teams with routine assignments that relate to their design or research process through oral and written communication.

MDS 490L - Adv MEMS: Modeling & Packaging 0 Credits

Hours: 0R-0L-0C
Graduate Studies Eligible: No
Prerequisites: None

MDS 537 - Introduction to MEMs: Fabrication & Applications 4 Credits

Hours: 3R-3L-4C
Term Available: S
Graduate Studies Eligible: Yes
Prerequisites: None

Properties of silicon wafers, wafer-level processes, vacuum systems, thin film deposition via PVD, dry and wet etching, photolithography, surface and bulk micromachining, process integration, simple actuators. MEMS applications: heat actuators, capacitive accelerometer, cantilever, and pressure sensor. The laboratory consists of cleanroom-based MEMS fabrication and testing activities. Students must do additional project work on a topic selected by the instructor.

MDS 539 - Advanced topics in MEMs 4 Credits

Hours: 3R-3L-4C
Term Available: W
Graduate Studies Eligible: Yes
Prerequisites: MDS 437 or MDS 537

Topics such as: Microlithography, design process, modeling: analytical and numerical. Use of software for layout design and device simulation. Actuator dynamics and thermal issues. Characterization and reliability of MEMS devices. Electrical interfacing and packaging of MEMS. Microsensors, microfluidic systems, and applications in engineering, biomedicine, and chemistry. The laboratory consists of cleanroom-based MEMS design, fabrication, and testing activities. Students must do additional project work on a topic selected by the instructor.