ITDE - INTERDISCIPLINARY ENGR

ITDE 610 Introduction to Engineering Innovation in Medicine

Credits 3. 3 Lecture Hours. Overview of concepts and topics at the intersection of engineering, medicine, and design for innovation including the design of medical technologies, rapid prototyping tools and techniques; discussion of intellectual property protection, and commercialization strategies, engineering design processes, design in a regulated environment (FDA Quality System Regulation), ideation and concept development methods, prototype development technologies, pre-clinical testing, path-to-market strategies, and entrepreneurship. **Prerequisite:** Admission to the EnMed program; approval of instructor.

ITDE 611 Engineering Foundations in Medicine I

Credits 3. 3 Lecture Hours. Exploration of the intersection of engineering, medicine and design which reinforces and practices the first portion of the biodesign curriculum "Identify," which involves finding and exploring important unmet health needs; exposure to problems and opportunities from clinicians, faculty and professionals, as well as cutting edge research, and a wide breadth of past, present and future medical technologies related to College of Medicine coursework. **Prerequisite:** ITDE 610 or approval of instructor.

ITDE 612 Engineering Foundations in Medicine II

Credits 3. 3 Lecture Hours. Exploration of the intersection of engineering, medicine, and design which reinforces and practices the second portion of the biodesign curriculum "Invent," which involves brainstorming potential solutions, as well as organization and comparison against key criteria for satisfying identified needs; exposure to problems and opportunities from clinicians, faculty and professionals, as well as cutting edge research, and a wide breadth of past, present, and future medical technologies related to their College of Medicine coursework. **Prerequisite:** ITDE 611 or approval of instructor.

ITDE 613 Engineering Foundations in Medicine III

Credits 3. 3 Lecture Hours. Exploration of the intersection of engineering, medicine and design which reinforces and practices the third and final portion of the biodesign curriculum "implement," which involves taking the next steps in commercializing a new technology; exposure to problems and opportunities from clinicians, faculty and professionals, as well as cutting edge research, and a wide breadth of past, present and future medical technologies related to their College of Medicine coursework. **Prerequisite:** ITDE 612 or approval of instructor.

ITDE 614 Journal Club for Engineering Innovation in Medicine

Credit 1. 1 Lecture Hour. Exploration of contemporary medical and engineering literature; identifying needs and opportunities for innovation in the standard and quality of patient care; includes weekly seminars. **Prerequisites:** ITDE 610 or approval of instructor.

ITDE 624 Engineering Analysis of Clinical Processes I

Credit 1. 0 Lecture Hours. 1 Other Hour. Introduction and overview of the exploration of the intersection of engineering, medicine and design by development of an understanding of the bio-design practice during clerkship; overview of experiences in medical clerkships and electives; recording of experiences to initiate the habit of regular reflection; development of a personal library of identified clinical needs. **Prerequisite:** ITDE 613 or approval of Instructor.

ITDE 625 Engineering Analysis of Clinical Processes II

Credit 1. 1 Other Hour. Foundational analysis I of the exploration of the intersection of engineering, medicine and design by actively practicing the bio-design practice during clerkship; reflection on experiences in medical clerkships and electives; recording of experiences to build the habit of regular reflection; development of the foundation of a personal library of identified clinical needs. **Prerequisite:** ITDE 624 or approval by instructor.

ITDE 626 Engineering Analysis of Clinical Processes III

Credit 1. 0 Lecture Hours. 1 Other Hour. Foundational analysis II of the exploration of the intersection of engineering, medicine and design by active practice of the bio-design practice during clerkship; reflection on experiences in medical clerkships and electives; recording of experiences to continue building the habit of regular reflection; continuation of the formation of a personal library of identified clinical needs. **Prerequisite:** ITDE 625 or approval of instructor.

ITDE 627 Engineering Analysis of Clinical Processes IV

Credit 1. 1 Other Hour. Advanced analysis I of innovation of the bio-design process in engineering and medicine during clerkship; assessment of experiences in medical clerkships and electives; recording of experiences to continue building on regular reflection; evidence of a personal library of identified clinical needs. **Prerequisite:** ITDE 626 or approval of instructor.

ITDE 628 Engineering Analysis of Clinical Processes V

Credit 1. 0 Lecture Hours. 1 Other Hour. Advanced analysis II of innovation of the bio-design process in engineering and medicine during clerkship; assessment of experiences in medical clerkships and electives; recording of experiences to continue building on regular reflection; demonstration of a personal library of identified clinical needs. **Prerequisite:** ITDE 627 or approval of instructor.

ITDE 640 Innovation Immersion in Engineering Design I

Credits 4. 1 Lecture Hour. 6 Lab Hours. Exploration of design thinking and the entrepreneurial mindset in innovation; use of a non-linear, iterative process to reframe identified clinical needs; creation of innovative solutions using the ideation, prototyping and testing process; foundation in translation of clinical needs into measurable technical outcomes. **Prerequisite:** Admission to the EnMed program; approval of instructor.

ITDE 641 Innovation Immersion in Engineering Design II

Credits 4. 1 Lecture Hour. 6 Lab Hours. Exploration of design thinking and the entrepreneurial mindset in innovation; use of a non-linear, iterative process to reframe identified clinical needs; creation of innovative solutions using the ideation, prototyping and testing process; continuation of translation of clinical needs into measurable technical outcomes. **Prerequisite:** ITDE 640 or approval of instructor.

ITDE 642 Innovation Immersion in Engineering Design III

Credits 4. 1 Lecture Hour. 6 Lab Hours. Advanced exploration of design thinking and the entrepreneurial mindset in innovation; use of a non-linear, iterative process to reframe identified clinical needs; creation of innovative solutions using the ideation, prototyping and testing process; culmination in translation of clinical needs into measurable technical outcomes. **Prerequisite:** ITDE 641 or approval of instructor.

ITDE 684 Professional Internship

Credits 1 to 10. 1 to 10 Other Hours. Supervised work in an area closely related to the student's specialized field of study. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis. **Prerequisites:** Graduate classification in interdisciplinary engineering; approval of instructor.

ITDE 685 Directed Studies

Credits 1 to 12. 1 to 12 Other Hours. Directed individual study of selected interdisciplinary topics in engineering, study focused on established knowledge.

ITDE 689 Special Topics In...

Credits 1 to 4. 1 to 4 Lecture Hours. Selected topics in an identified area of interdisciplinary engineering. May be repeated for credit. **Prerequisites:** Approval of instructor.

ITDE 691 Research

Credits 1 to 23. 1 to 23 Other Hours. Research for thesis or dissertation.

ITDE 702 Engineering Education Research Design and Methods

Credits 3. 3 Lecture Hours. Survey of engineering education research methodologies, design and methods; research epistemologies, theories and conceptual frameworks; methods for qualitative, quantitative and mixed methods research; synthesis of literature using formal procedures; use of quality frameworks in engineering education research. **Prerequisite:** Graduate classification.

ITDE 703 Learning, Motivation, and Critical Theories in Engineering Education

Credits 3. 3 Lecture Hours. Identification of genres and theoretical perspectives within engineering education research; exploration of classical research theorists and their relevance with engineering education; learning, motivation, and critical theories and their roles in engineering education research; process for engagement in theorizing; patterns of theoretical and conceptual frameworks for research; positioning current research within the relevant conceptual or theoretical framework(s). **Prerequisites:** ITDE 702 and graduate classification.

ITDE 710 Research Lifecycle and Publication in Engineering

Credits 3. 3 Lecture Hours. Development and trends in publishing and scholarly communication for disciplinary and interdisciplinary engineering; effective reading and writing of research; research methods such as evidence synthesis in engineering; the research lifecycle, publication trends, conference and journal impact and selection; protocol for evidence synthesis; preparation of a draft manuscript for journal submission. **Prerequisites:** Graduate classification.