EN.655 (HEALTHCARE SYSTEMS ENGINEERING)

EN.655.662. Intro to Healthcare Systems Engineering. 3 Credits.
This course introduces students to the fundamental principles of healthcare systems engineering and their application to the development of complex systems. It describes how the systems engineering viewpoint differs from that of the healthcare provider, as well as the essential role that systems engineering plays as an integral component of program management. Topics include integrated systems engineering life cycle purpose and constructs, delineation of different complex system types, requirements analysis, concept definition, system synthesis, design trade-offs, risk assessment, interface definition, engineering design, system integration, and related systems engineering activities. The course defines the breadth and depth of the knowledge that the healthcare systems engineer must acquire concerning the characteristics of the diverse components that constitute the total system. Special topics include healthcare system scenario extensively to illustrate systems engineering principles and specific product design issues. Prerequisite(s): EN.655.667 Healthcare System Conceptual Design or permission of the student's faculty advisor and the instructor.

EN.655.667. Management of Healthcare Systems Projects. 3 Credits.
The course addresses the management of a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the healthcare systems project manager. From the development of a proposal to the delivery of a product and/or service to a customer, the efforts to conceive, plan, budget, schedule, monitor, control/direct, and report the progress of the project are discussed. Throughout the project life cycle, the need for good communications, interface and configuration management, and conflict resolution is emphasized. Students assume the role of project managers who must use management tools such as WBS, EVM, and CPN and who must address typical problems that arise in the conduct of a high-technology systems project.

EN.655.768. Healthcare System Design & Integration. 3 Credits.
This course addresses the healthcare systems engineering objectives, responsibilities, and activities during two phases of the system development life cycle: demonstration and validation, and engineering and manufacturing development. Healthcare systems engineering procedures and tools used during these phases are identified and their use illustrated. Topics include the relationship between a system specification and the system design, risk management and patient safety, system design models, healthcare provider and patient integration into the design process, and healthcare design disciplines and practices. The course uses a healthcare system scenario extensively to illustrate systems engineering principles and specific product design issues. Prerequisite(s): EN.655.667 Healthcare System Conceptual Design or permission of the student's faculty advisor and the instructor.

EN.655.769. Healthcare System Test and Evaluation. 3 Credits.
This course focuses on the application of systems engineering principles to the test and evaluation of healthcare system elements and, ultimately, of the total system. Test requirements, selection of critical test parameters, analysis of test results, and determination of remedial action in the event of discrepancies are all systems engineering functions. Topics include validation and verification, similarities and differences in the nature of hardware and software testing, test tools and test procedures, testing during hardware–software integration, quality assurance test, environmental test, and operational test and evaluation. Student problems include scenario case studies using examples developed in the several previous courses. Prerequisite(s): EN.655.668 Healthcare System Design and Integration or permission of the student's faculty advisor and the instructor.

EN.655.771. Healthcare Systems. 3 Credits.
This course will cover the fundamental elements of modern healthcare systems, including their structure, processes, and related to information systems and system interfaces. It also covers the organization, financing, and delivery of healthcare in the United States. It also discusses several potential small and large-scale reforms to the U.S. healthcare system and evaluates their likely effects on healthcare spending, quality of care, and access to care. Prerequisite(s): EN.655.767 Healthcare System Conceptual Design or permission of the student's faculty advisor and the instructor.

EN.655.800. Healthcare Systems Engineering Capstone Project. 3 Credits.
This course provides the experience of applying systems engineering principles and skills learned in the formal courses to a specific practical healthcare system project that is suggested by the student and is presented in a formal proposal. The product of the system project is a final report; also required are interim reports and an oral presentation to permit review of the project objectives and approach. A student typically has a mentor who is a member of the Systems Engineering faculty. The program chair and mentor review proposals and reports. The total time required for this course is comparable to the combined class and study time for the formal courses (formerly 645.770). It is self-paced and often takes more than one semester to complete. Prerequisite(s): EN.655.769 Healthcare System Test and Evaluation and completion of at least 3 of the four required electives and permission of course instructor.