

SYEN - SYSTEMS ENGINEERING

SYEN 640 Systems Thinking and Analysis

Credits 3. 3 Lecture Hours. Introduction to the systems thinking process and the fundamental considerations associated with the engineering of large-scale systems or system of systems. **Prerequisites:** Graduate classification; MATH 304 or approval of instructor.

SYEN 641 Systems Engineering Methods and Frameworks

Credits 3. 3 Lecture Hours. Concepts, methodologies, methods and tools for discovery, definition, analysis, design, creation and sustainment of systems involving information, physical and human elements; architecture modeling methods include IDEF/UPDM; systems engineering frameworks include DoDAF/MoDAF and Zachman; analysis tools include executable architectures to assess consistency, interoperability and performance. **Prerequisite:** MATH 304 or approval of instructor.

SYEN 642 Systems Performance Modeling

Credits 3. 3 Lecture Hours. Development and formulation of models to evaluate and improve system performance; Survey of Math Programming; decision trees; simulation models; and economic evaluation of systems; examples and applications of linear programming, nonlinear programming, integer programming, systems simulation, multi-objective formulations, solution interpretation and sensitivity analysis.

SYEN 643 Theory of Socio-Technical Systems

Credits 3. 3 Lecture Hours. Philosophy, origins, theory, principles and methodologies of complex socio-technical systems; emphasis on holistic thinking for systems engineering; systems approach; cybernetics; complexity science; physical and biological systems; social, economic and political systems; network representations of systems; real-world decision-making; systems dynamics; emergent behavior; systems architecture; engineered systems today and in the future. **Prerequisite:** Graduate classification.

SYEN 644 Decision Making Under Uncertainty in Systems Engineering

Credits 3. 3 Lecture Hours. Formulating models and making engineering decisions about systems and systems of systems operating under uncertainty; review of probabilistic modeling and statistical analysis; risk analysis and assessment for complex stochastic systems; mathematical decision theory, heuristic decision methods, value-driven decision making, sequential decision problems, real options theory and deferred decision making. **Prerequisite:** Graduate classification.

SYEN 645/ISEN 665 Management of Engineering Systems

Credits 3. 3 Lecture Hours. Theory and practice of leadership and management in engineering organizations; focus on both "hard" skills (systems engineering process, project management, planning, forecasting, financial analysis) and "soft" skills (leadership styles, motivation, teamwork, managing creative people, navigating informal networks); science and technology policy; economic implications of engineering and technology. **Prerequisite:** Graduate classification. **Cross Listing:** ISEN 665/SYEN 645.

SYEN 684 Professional Internship

Credits 1 to 10. 1 to 10 Other Hours. Supervised experience of systems engineering related work in industry. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis. **Prerequisites:** Admission to the Master of Engineering in systems engineering program; graduate classification.

SYEN 685 Directed Studies

Credits 1 to 12. 1 to 12 Other Hours. Offered to enable students to undertake and complete limited investigations not within their thesis research and not covered by any other courses in curriculum. **Prerequisite:** Graduate classification.

SYEN 691 Research

Credits 1 to 23. 1 to 23 Other Hours. Research for thesis or dissertation. May be repeated for credit. **Prerequisite:** Graduate classification.