

# SYEN - SYSTEMS ENGINEERING

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## **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/ISEN 670 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; system dynamics; emergent behavior; systems architecture; engineered systems today and in the future.

**Prerequisite:** Graduate classification.

**Cross Listing:** ISEN 670/SYEN 643.

## **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.