Course Descriptions

ENGR 501* – Foundations of Systems Engineering
The Foundations of Systems Engineering course is an introductory overview of the systems engineering perspective and is presented to set the conceptual and practical framework of the entire systems engineering graduate program. The course covers the foundational components of systems engineering, the concept development stage every viable system must go through, and the process steps of the engineering development stage. Several issues related to post-development and special topics areas are presented.

ENGR 510 – Engineering Optimization: Method/Application
Optimization methods; linear programming, simplex algorithm, duality, sensitivity analysis, minimal cost network flows, transportation problems.

ENGR 520 – Engineering Decision Support/Expert Systems
Decision support systems for complex engineering problems; multicriteria decision making and optimization; hybrid knowledge-based/algorithmic methods.

ENGR 530* – Overview of Systems Engineering Processes
This course helps students develop a conceptual understanding of the systems engineering life-cycle process and familiarity with analysis techniques used in that process. It also introduces concepts of reliability and robustness, and rigorous tools for analysis and design with them in mind. The course utilizes real-world experience and case studies of working with a system through all phases of the system design process.

ENGR 531* – Engineering Risk Analysis
Successful engineering project management includes estimation and proactive risk identification and development of mitigation techniques. System uncertainty is reduced when project risks are identified, quantified, and mitigation strategies implemented. Tools, techniques, and methodologies used by successful project managers will be examined.

ENGR 532 – Dynamics of Complex Systems
This course deals with understanding the higher-level behavior and issues that emerge from interaction between components in complex socio-technical systems. The course emphasizes system thinking, dynamic cause and effect relationships, and the higher-level emergent behavior that results from the interaction of many smaller effects that are individually well understood, but more difficult to grasp at a higher level.

ENGR 565 – Electrical Power Engineering
Analysis of power systems in terms of current, voltage, and active/reactive power; introduction of computer-aided tools for power systems.

ENGR 567 – Systems Engineering Architecture
Introduction to formal system architecture methods and Model-Based Systems Engineering (MBSE) using the Model-Based System Architecture Process (MBSAP) with detailed examples. Students apply the methodology to build architecture models of systems of their choice. Topics include Service-Oriented Architecture (SOA), Real-Time systems, secure systems, and networked enterprise architecture.

ENGR 597 – Group Study (ME Students only)
This course requires students to complete a systems engineering project, with a formal report on the results. Requires faculty advisor to enroll.

ENGR 695 – Independent Study (MS Plan B Students only)
This course is not delivered by distance media; it is driven by an agreement between the instructor and the student. Requires faculty advisor to enroll.

ENGR 699 – Thesis (MS Plan A Students only)
This course is not delivered by distance media; it is driven by an agreement between the instructor and the student. Requires faculty advisor to enroll.
ENGR 795 – Independent Study – Publication Replacement *(PhD Students only)*
Students who have had two papers accepted for publication, with research done while enrolled at CSU, may be eligible for this credit.

ENGR 799 – Dissertation *(PhD Students only)*
This course is not delivered by distance media; it is driven by an agreement between the instructor and the student.

MECH 501* – Engineering Project and Program Management
Engineering program management fundamentals, program planning and control strategies, risk assessment, work breakdown structures and costing options.

MECH 513 – Simulation Modeling and Experimentation
Includes SIGMA for Windows, a resident entity oriented event graph simulation language to master the underlying structure and workings of simulation languages, and ARENA, an entity flow oriented simulation language similar to most commercial simulation languages. Enables you to accomplish simulation studies in a matter of hours rather than days, and will provide you with the capability for easily mastering any other simulation language. Learn to set up and conduct proper simulation experiments as well as build simulations of many common systems, including sequential manufacturing operations, service operations, assembly operations and machine breakdown and repair.

CIS 600* – Information Technology and Project Management
Course topics include balancing project stakeholder requirements for scope, time, cost, quality, risk, and human factors. The course emphasizes the Project Management Institute's (PMI) body of knowledge and considers PMP/CAPM professional certifications.

CIS 610 – Software Development Methodology
This course covers methods for all phases of software development focusing on the establishment of economical software that is reliable and cross platform compatible.

CIS 670* – Advanced IT Project Management
In this class, an applied examination of project management is conducted with an emphasis on preparing for and completing PMI certification. The focus is on the Project Management Body of Knowledge (PMBOK® Guide). This course aims to prepare you to test for either Certified Associate in Project Management (CAPM)® or Project Management Professional (PMP)®.

ECE 566 – Energy Conversion for Electrical Power Systems
Energy conversion; fuel cell, battery storage, solar-photovoltaic, wind energy and traditional rotating-magnetic-field based machines.

ECE 568 – Electrical Energy Generation Systems
Energy systems: renewable and traditional. Physics and operation of energy devices; solar-photovoltaic, wind energy, gas, coal and nuclear plants.

ECE 621 – Energy Storage for Electrical Power Systems
Theory and practice of electrical, mechanical, thermal and novel energy storage systems/devices.

ECE 622 – Energy Networks and Power Distribution Grids

Electives
There is no set list of electives. If your program requires electives, please work with the Systems Engineering program to help determine the electives that would best fit your academic and/or professional goals. Electives can be anything from the above Systems Engineering curriculum or must be approved by the program.

*Included in Systems Engineering Core (four courses). Choose MECH 501 or CIS 600 or CIS 670.