THE ACADEMY EDUCATES, TRAINS AND INSPIRES MEN AND WOMEN TO BECOME OFFICERS OF CHARACTER.

SYSTEMS ENGINEERING MAJOR

Suggested Course Sequence

3rd- Class Year	2nd-Class Year	1st-Class Year
Aero Engr 210 or 315	BehSci 310	AstroEngr310
Chem 200	Comp Sci 211	BehSci 373
Econ 201	Depth Opt	Biology 315
English 211	Depth Opt	Depth Opt
EngrMech 220	ECE 231	Depth Opt
Law 220	History 300	English 411
Math 245 or 344	Math 356	MSS 416
MSS 200	Math 243 or 359	Philos 310
Ops Rsch 310	Ops Rsch 312	SocSci 412
Physics 215	Sys Engr 301	Sys Engr 405
Pol Sci 211	Sys Engr 311	Sys Engr 406/402
Sys Engr 310	Sys Engr 336	Sys Engr 477
		Sys Engr 491
		Sys Engr 492

SYSTEMS ENGINEERING (Sys Engr)

Administered by the Departments of Aeronautical Engineering (DFAS), Astronautical Engineering (DFAN), Behavioral Sciences(DFBL), and Electrical and Computer Engineering (DFEC) with participation by the Department of Management (DFM).

Sys Engr 301. Project Management.Teaches how to properly plan, implement and control organizational activities, personnel and resources. Includes project selection, roles and responsibilities of the project manager, planning, budgeting, scheduling, allocating resources, monitoring/controlling, evaluating/terminating, and risk assessment/management of the project.Addresses how to structure the organization and allocate human resources. Case studies illustrate problems and how to solve them. Assignments help students learn and apply project management techniques taught in the course. Class design project provides students an opportunity to integrate project management software, Microsoft Project, into preparations of a project plan for an engineering project. Students also use Monte Carlo simulation to evaluate product uncertainty. Administered by the Department of Management.

Sys Engr 310. Introduction to Systems Engineering. Introduction to the systems engineering process and the developmentlifecycle as a foundation for solving complex problems to fulfill end user needs. Focuses on the systems engineering lifecycleprocess that includes design, concurrent engineering, software engineering and the concepts of reliability, maintainability andavailability.Presents skills and tools that are foundational in the development of interdisciplinary systems engineers. In parallelwith the course material, a semester-long system development project facilitates application of systems engineering principles.

Sys Engr 311. Decision Analytics for Systems Development. Covers analytic techniques supporting Analysis of Alternatives (AoA) and system development. This course teaches how to model the uncertainty surrounding

systems planning. Concepts include decision models: representing decision scenarios using value hierarchies or decision trees, introducing influence diagrams, utilizing the value of information, evaluating levels of risk, and conducting sensitivity analyses. The course also integrates various life cycle cost methods such as forecasting, causal regression, and simulation into the decision making framework. Administered by the Department of Management.

Sys Engr 336. Engineering Economics and Financial Management. Studies financial decisions and their effects on organizations.Prepares students to consider the economic dimension in the evaluation of engineering alternatives--a consideration vital to the Systems Engineering Lifecycle, engineering management, systems acquisition and many other application areas.Emphasizes developing the concept of risk/return tradeoff as well as inter-cost temporal monetary tradeoffs.Introduces accounting conceptsincluding cost analysis, breakeven analysis, time value of money, project analysis/capital budgeting (including annual equivalence), interest rates, economic service life, and the weighted average cost of capital. Case studies and problems expose the student to current financial problems and their solutions. Presumes no prior knowledge of accounting. Credit will not be given for both Sys Engr 336 and Mgt 337.

Sys Engr 356. UAS Flight Test Techniques. In this capstone course, cadets in the Remotely Piloted Aircraft (RPA) track will learn AFMC-approved methods in Group 1, small UAS (sUAS) flight test. The course will expose cadets to test plan development, execution and data collection, dissimilar aircraft control, test report writing, and evaluation. Lessons and projects emphasize fundamentals of flight testing, critical thinking, multiple sUAS autopilot and interface systems, risk management, innovation, and joint operational concepts as cadets design, execute and report findings within a complex environment. Graduates who achieve Flight Test Operator status IAW AFI 11-502 standards are expected to serve as sUAS test pilots to support DF research at least 1 semester each year.

Sys Engr 402. Professional Systems Engineering Development. Review of Systems Engineering principles; acquisition life cycle stages; technical, project, agreement, organizational, and tailoring processes; and specialty engineering activities in preparation for the internationally-recognized Certified/Associate Systems Engineering Professional (CSEP) certification exam administered at the end of the course by the International Council on Systems Engineering (INCOSE). This course meets in conjunction with Sys Engr 406. Targeted towards Systems Engineers and who will support or work in a Department of Defense acquisition environment. An annual INCOSE membership fee must be paid by the student to take the exam and maintain or improve the certification; therefore, taking the exam is not required.

Sys Engr 405. Systems Engineering Colloquium I. Designed to give Systems Engineering majors an exposure to the wide applicability of their common knowledge and to share knowledge across the various capstone design projects.Helps transition Systems Engineering majors to duties as an Air Force officer and systems engineering professional. Students make one graded presentation about their specific capstone experience. Guest speakers discuss current issues in large complex systems and typical engineering and management problems which students may encounter during their capstone design and after graduation.

Sys Engr 406. Systems Engineering Colloquium II. Designed to give Systems Engineering majors an exposure to the wide applicability of their common knowledge and to share knowledge across the various capstone design projects.Helps transition Systems Engineering majors to duties as an Air Force officer and systems engineering professional. Students make one graded presentation about their specific capstone experience. Guest speakers discuss current issues in large complex systems and typical engineering and management problems which students may encounter during their capstone design and after graduation.

Sys Engr 460. Unmanned Aerial Vehicle-Remotely Piloted Aircraft (UAV-RPA) Systems. Introduction to unmannedaerial vehicle-remotely piloted aircraft (UAV-RPA) systems and systems engineering processes used to

build them. Topicsinclude air vehicles and capabilities, ground control stations, payloads, personnel training and support systems. Students workon interdisciplinary teams to build, fly and test one or more UAV-RPA systems.

Sys Engr 470. Human Systems Integration. Examines how Human Systems Integration (HSI) plays a critical role inthe design, production and implementation of military systems. Although certain systems are designed for uses that maybe unique to a particular armed forces organization, the principles and applications discussed are (as far as possible)generic and can therefore be applied to almost any weapons system design program. Also examined are HSI as a systemsengineering (SE) discipline and why HSI must be a core component of systems engineering. Students review the major HIS-relatedareas of concern (domains) that should be assessed when designing, producing and implementing a system.

Sys Engr 477. Operations Engineering and Management..Deals with the quantitative aspects of design and analysis of production and service operations engineering and management within the Systems Engineering Lifecycle.Emphasizes identification, analysis, and solution implementation of operations problems using applied quantitative techniques. Practical exercises reinforce the problem-solving techniques necessary for today's successful military engineering managers and systems engineers. Specific methods and techniques taught and applied are operations strategy, product design and selection, supply chain management, quality management, reliability, maintainability and capacity planning. Introduces basic concepts of modeling complex discrete systems by computer simulation as a key tool in analyzing and improving operations.Administered by the Department of Management.

Sys Engr 491. Systems Engineering Capstone Design I. Capstone design experience for Systems Engineering (SE) majors. Emphasizes execution of the systems engineering process over the entire development lifecycle of a complex system. Students are placed in systems engineering roles on existing capstone design projects in various departments and apply the systems engineering tools acquired in previous systems engineering coursework.

Sys Engr 492. Systems Engineering Capstone Design II. Continuation of Sys Engr 491.

Sys Engr 495. Special Topics in Systems Engineering. Selected topics in systems engineering.

Sys Engr 499. Independent Study. Individual study, research or design supervised by a faculty member. Topic establishedwith the permission of the department head.