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Systems Engineering Management - System Acquisition Curriculum 522

Program Officer

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Brief Overview

The Systems Engineering Management program is an interdisciplinary program combining systems engineering with acquisition management knowledge and skills. The program is intended to broaden the technical capabilities of officers who may have non-technical backgrounds, so they are able to manage and lead acquisition programs for the complex combat systems the DoD needs. Students in this program learn the systems engineering process from establishing system requirements through test and evaluation. Simultaneously students learn how to manage, schedule, and budget programs as well as work with DoD suppliers through contracts to meet program obligations.

Requirements for Entry

A baccalaureate degree with above-average grades is required. Completion of at least two semesters of college algebra or trigonometry is considered the minimum mathematical preparation. An APC of 345 is required for entry. International students should refer to the Admissions section for current TOEFL and entrance requirements.

Program Starting Date

January and July

Program Length

Six Quarters

Degree

Completion of all the requirements of curriculum 522 leads to the award of the Completion of all the requirements of curriculum 522 leads to the award of the ***Master of Science in Systems Engineering Management (MSSEM)***.

Curriculum Sponsors

Director, Acquisition Career Management, Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology): ASA/ALT (DACM)

Typical Course of Study

The typical course of study reflects the Army Acquisition Officer sequence of courses to meet the desire for JPME and qualification for DAWIA in Project Management, Contracting, and Systems Engineering. Other students may work with the academic associate to develop an alternative course of study adhering to the MSSEM degree requirements.

Quarter 1

Course	Title	Lecture Hours	Lab Hours
OS3111	Probability and Statistics for HSI and MOVES	4	0
MN3331	Principles of Acquisition and Program Management	5	1
MN3303	Principles of Acquisition and Contract Management	4	0
NW3275	Joint Maritime Operations I	4	0

Quarter 2

OA3411	Introduction to Human Systems Integration	3	0
SE3100	Fundamentals of Systems Engineering	3	2
SE4003	Systems Software Engineering	3	2
MN3312	Government Contracts Law	4	0
NW3276	Joint Maritime Operations II	2	2

Quarter 3

SE3011	Engineering Cost Estimation	3	0
SI3400	Engineering Program Management	3	2
MN3320	Contract Cost and Price Analysis	3	0
MN3321	Federal Contract Negotiations	3	0
NW3285	Theater Security Decision Making	4	0

Quarter 4

SE3077	Methods in Engineering Research	3	0
SE3302	System Suitability	3	2
SE4150	System Architecting and Design	3	2
MN3315	Acquisition Management and Contract Administration	4	0
MN4311	Contracting for Services	3	0

Quarter 5

SE3211	Systems Engineering Management Capstone I	2	4
SE4354	System Verification and Validation	4	0
SE4520	System Manufacturing Development and Production	3	2
NW3230	Strategy & War	4	2

Quarter 6

SE3212	Systems Engineering Management Capstone II	2	4
SE4012	Management of Advanced Systems Engineering	4	0
SE4xxx	Systems Engineering Technical Elective	3	0
MN4371	Acquisition and Contracting Policy	4	0

Educational Skills Requirements (ESR)

Systems Acquisition Management - Curriculum 522

1. **System Engineering Management:** The graduate will have an understanding of the systems engineering process and be able to contribute to the definition of system requirements, evaluation of system architecture, verification and validation activities, system integration, and system design in the context of defense system acquisition.
2. **System Architecting:** Perform system architecting, applying and integrating methods for both software and hardware aspects. Construct feasible system functional and physical architectures that represent a balanced approach to meeting stakeholder needs and expectations, stated, implied, and derived system requirements, and suitability objectives such as being open, modular, extensible, maintainable, and reusable. Understand system architecture frameworks, including the Department of Defense Architecture Framework (DODAF), and their role in architecture development. Use model-based systems engineering techniques, based on UML or SysML to create, define, and develop system architectures. Develop, analyze, and compare alternative architectures against appropriate, system-level evaluation criteria and select the best based on quantitative and qualitative analysis, as appropriate.
3. **System Design.** Understand and apply the system design process in a holistic context, applying and integrating methods for both software and hardware aspects for manned or unmanned and autonomous systems including identifying needed capabilities, defining requirements, conducting functional analysis and allocation to hardware, software, and human elements, creating a system functional design, designing a system, deriving and defining requirement specifications, allocating requirement specifications to sub-systems (for hardware, software, and human elements), designing for characteristic such as suitability, including reliability, availability, maintainability, interoperability, system security, and logistical supportability. Perform system assessment by conducting trade-off studies, evaluating system design alternatives against system capability need expressed as military effectiveness, estimating and analyzing the system cost and risk, including risk mitigation strategies, integrating human elements into the system design, and analyzing and planning for system testing and evaluation.
4. **Human Systems Integration.** Address human factors during requirements definition, as well as workload, safety, training, operability and ergonomics during design. Conduct functional analysis and allocation to human elements, performing cost risk-effectiveness trade-offs among hardware, software, and human elements. Evaluate proposed designs for man-machine integration, human performance testing and usability during development test and evaluation.
5. **Project Management:** Work as a team member or leader on a military systems engineering project. Demonstrate an understanding of project management principles. Demonstrate competence in the planning and management of complex projects. Understand the principles of and apply current industry approaches and technology to manage systems design, integration, test, and evaluation for large engineering projects.
6. **System Test & Evaluation.** Apply the core skills of system test and evaluation to include system effectiveness while being responsive to realistic military capability need and war fighting effectiveness, requirements, functions, and specifications. Evaluate systems and analyze test and evaluation aspects during the entire life-cycle using inferential statistics methods, including design of experiments (DOE) and analysis of variance (ANOVA). Apply fundamental verification and validation principles to systems development methods.
7. **Program Leadership and Management Principles:** The graduate will have an understanding of and will be able to apply the principles, concepts, and techniques of Program Leadership and Program Management to the acquisition of major defense weapon systems. This includes the principles of risk management and tradeoff decision analysis using Total Ownership Cost, schedule and performance dynamics from a total life cycle management perspective.
8. **Program and Contract Management Policies:** The graduate will have an ability to formulate and execute defense acquisition policies, strategies, plans and procedures; an understanding of the policy-making roles of various federal agencies of the executive, legislative and judicial branches of the U.S. government, particularly the Department of Defense (DoD), the General Accounting Office (GAO), congressional committees, the Office

of Management and Budget (OMB); the federal and military contracting offices, the Boards of Contract Appeals, and the court system; and an understanding of the strategies necessary to influence policy development and implementation.

9. **Systems and Acquisition Process:** The graduate will understand the theory of and have an ability to lead program teams and manage the systems acquisition process. This involves the system life cycle process for requirements determination, research and development, funding and budgeting, procurement, systems engineering, including systems of systems, and applying the system design process in a holistic context, integrating methods for both software and hardware aspects for manned, unmanned and autonomous systems including identifying needed capabilities, defining requirements, conducting functional analysis and allocation to hardware, software, and human elements, creating a system functional design, test and evaluation, including its role in Systems Acquisition, DT and OT test planning, design, and conduct of tests, spanning live fire testing, modeling and simulation, and human systems integration, manufacturing and quality control, integrated logistics support, ownership and disposal; the interrelationship between reliability, maintainability and logistics support as an element of system effectiveness in defense system/equipment design; and embedded weapons system software, particularly related to current policies and standards, software metrics, risk management, inspections, testing, integration, and post-deployment software support.
10. **Contract Management:** The graduate will understand the role of the contracting process within the acquisition environment, including financial, legal, statutory, technical, and managerial constraints in the process. They will have knowledge of acquisition laws and regulations, particularly the Federal Acquisition Regulation (FAR) and the DoD FAR Supplement (DFARS); and the application of sound business principles and practices to defense contracting problems in order to be able to apply innovative and creative approaches to re-solve difficult acquisition and contracting issues.
11. **Business Theory and Practices:** The graduate will have an understanding of the business and operating philosophies, concepts, practices and methodologies of defense industry with regard to major weapon systems acquisition, particularly the application of sound business practices.
12. **Ethics and Standards of Conduct:** The graduate will have an ability to manage and provide leadership in the ethical considerations of defense acquisition, including the provisions of procurement integrity, and to appropriately apply defense acquisition standards of conduct.