

# DoD HSI Course Catalog

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This is a descriptive catalog of courses available from DAU, NPS and AFIT for Human Systems Integration Practitioners



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## 1- Executive Summary

This document is the result of a joint vetting effort by the Naval Postgraduate School HSI POC, Air Force Institute of Technology Human Systems POC, the HSI POC from the USCG, the Army HSI (MANPRINT) Office, the Air Force Human Systems Integration Office and operational Subject Matter Experts. The intentions of the document are to perform four main functions, namely:

1. Analyzes and establishes a set of courses available, at no cost, from the Defense Acquisition University (DAU) and the Air Force Institute of Technology (AFIT). These courses will equip DoD Human Systems Integration (HSI) practitioners with the critical contextual knowledge to provide the required technical expertise from activities such as developmental planning to capability disposal within the DoD acquisition framework. The stipulated courses are structured in synergy with the Defense Acquisition Workforce Improvement Act (DAWIA) qualification coding; thus, the courses are selected with technical depth and levels of complexity for accession of levels 1, 2, and 3 practitioners.

It is expected that DoD Human Systems Integration practitioners will have attained the minimal prerequisite requirements such as: formal education measured by a technical baccalaureate degree for knowledge basing, and experience specified by a hiring directorate for skill based assessment in personnel selection.

2. Identifies and describes graduate-level certificates available from the Naval Post Graduate School (NPS) in Human Systems Integration, and the Air Force Institute of Technology (AFIT) Systems Engineering Certificate with Human Systems focus. The HSI certificate from NPS is available as a residence program and also online via a distant learning apparatus. The AFIT Systems Engineering Certificate with Human Systems focus is a residence program with future plans for distant learning apparatus. Both programs are available to any US government affiliated students (government and government contractors); tuition is required.
3. Identifies and describes graduate degree programs available from NPS in Human Systems Integration, and three (3) Master of Science programs with Human Systems specializations from AFIT. The Master of Science in HSI from NPS is available either online via a distant learning apparatus or in-residence. The AFIT Master of Science programs stated as follows: Systems Engineering with Human Systems specialization, Intermediate Education in Systems Engineering with Human Systems specialization and an Engineering & Technology Management with Human Systems specialization. As of this writing, all of AFIT's Human Systems specializations are available via residence only; however, future plans are for distant learning delivery. Both programs are available to any US government affiliated students (government and government contractors); tuition is required.
4. Identifies and describes MANPRINT training courses that are available to practitioners (both governmental and contract employees) via CBT, Distant learning or resident; tuition is not required except costs associated with postal delivery of the course material.

## 2 - DAU and AFIT Training

### Necessary Training Courses for level I DoD HSI Practitioner

- **DAU Introduction to JCIDS (CLR 101)**

Description: This module provides an overview of the Joint Capabilities Integration & Development System (JCIDS) process and its role in the acquisition life cycle. The module focuses on terms, definitions, basic concepts, processes, and roles and responsibilities involved in implementing the JCIDS process.

This continuous learning requirements module is designed for DoD professionals who contribute to the Requirements generation and capability development process in various capacities to include: JCIDS analysis, subject matter or domain expertise, document staffing and coordination and/or administrative support.

This module takes approximately *3.5 hours* to complete. It contains an end of module test that must be passed with a 100% score; 4 CLPs are attained.

- **DAU Core Concepts for Requirements Management (RQM 110)**

Description: Core Concepts for Requirements Management provides a focused treatment concerning the role of both the requirements manager and requirements management within the Acquisition construct. It examines the capabilities and the process from an end-to-end perspective highlighting the intersection between Acquisition, Resources, and Requirements.

Modules cover requirements management overview in DoD, identifying and approving DoD requirements, acquisition as a method of fulfillment, test and evaluation, financial management, cost estimating, logistics capabilities and sustainment, science and technology, systems engineering, analysis and assessment, staffing and validation, non-materiel solutions, rapid response solutions, ICD, CDD support system development, CPDs, building performance attributes and key performance and building a capabilities-based requirement.

This module takes approximately *24 – 30 hours* to complete. It contains an end of module test that must be passed with a 100% score; 32 CLPs are attained.

- **DAU Fundamentals of Systems Planning, Research, Development, and Engineering (SYS 101)**

Description: This course is a technically rigorous, comprehensive introduction to Systems Engineering and the various Technical Management and Technical Processes involved in its application. Based around the 16 Systems Engineering processes outlined in the Defense Acquisition Guidebook (DAG), SYS 101 provides the essential foundations needed for Systems Planning, Research, Development and Engineering (SPRDE) careerists and others to effectively participate in the application and the management of DoD Systems Engineering processes and their activities.

This module takes approximately *35 hours* to complete. It contains an end of module test that must be passed with a 100% score; 35 CLPs are attained.

- **DAU Human Systems Integration (CLE062)**

This module is designed to provide the learner with the basic understanding of HSI as part of the DoD's Total Systems Engineering approach for optimizing system performance minimizing total ownership costs. Students will also be introduced to the HSI domains of Human Factors Engineering, Personnel, Habitability, Manpower, Training, Environment, Safety and Occupational Health, and Survivability.

This module takes approximately *2 hours* to complete. It contains an end of module test that must be passed with a 100% score; 2 CLPs are attained.

- **DAU Fundamentals of Acquisition Management (ACQ 101)**

This course provides a broad overview of the DoD systems acquisition process, including the basics of system acquisition management and the life cycle of a Defense system from inception to disposal. The course covers all phases of acquisition including, concept exploration, development, production, fielding and deployment. It introduces the requirements generation and resource allocation processes, the DoD 5000-series documents governing the Defense acquisition process, and current issues in systems acquisition management.

This module takes approximately *25 hours* to complete. It contains an end of module test that must be passed with a 100% score; 25 CLPs are attained.

- **AFIT Air Force Capability Based Operational Requirements (REQ 111)**

Description: This course is specifically designed for the new Major Command (MAJCOM), Field Operating Agency (FOA), Air Logistics Centes (ALC), and Headquarters Air Force (HAF) officers, analysts and system program office personnel who write or review operational capability requirements documents. The objective is to enhance the effectiveness of personnel directly developing the definition, validation, and refinement of operational capabilities. Each student will understand the hierarchy of Air Force requirements, the roles and responsibilities of AF organizations in the requirements process and how it fits with the acquisition and test processes. The class takes an in-depth look at the requirements activities to support acquisition decisions and milestones. It covers the staffing, coordination, validation and approval process for requirements documents. The class members also get hands-on experience with case studies for actual air force capabilities-based requirements documents. Students who successfully complete this course will be able to: 1) Understand the capabilities based planning process and the basics of requirements generation; 2) Explain the operational capability requirements process and its interface with the acquisition process; 3) Identify the steps involved in Air Force and Joint staffing, validation and approval of requirements documents; and 4). Recognize the format and content for each section of an ICD, CDD and CPD.

This module takes approximately *3 days* of live training sessions to complete. It contains an end of module test that must be passed with a 100% score; 18 CLPs are attained.

- **AFIT Systems Requirement Document Development (SYS 112)**  
Description: Using MIL-HDBK-520, *SRD Guidance*, as a primary source, this course provides students a basic understanding of why effectively translating war fighter Capabilities-Based Requirements documents (e.g., ICD, CDD, CPD, AF Form 1067) into an SRD is a critical step in both systems engineering and the overall acquisition process. In order to give the student a better understanding of how a SRD is developed, the course will discuss the different types of requirements, the Requirements Analysis/Management processes and how requirements traceability is created/maintained.

This module takes approximately *8 hours* to complete. It contains an end of module test that must be passed with a 100% score; 8 CLPs are attained.

*Necessary Training Courses for level II DoD HSI Practitioner;* In addition to Level 1 Training:

- **DAU Acquisition Logistics Fundamentals (LOG101)**  
Description: LOG 101 Acquisition Logistics Fundamentals provides a broad overview of acquisition logistics in the Joint Capabilities Integration and Development System (JCIDS) and Defense Acquisition System. Course modules cover the roles and responsibilities of the life cycle logistician in understanding operational support requirements, influencing the system design for supportability, developing the support solution and establishing a life cycle sustainment plan. LOG 101 emphasizes life cycle logistician contributions to the acquisition process through participation in integrated product teams. LOG 101 also provides a fundamental understanding of various logistics management tools and techniques.

This module takes approximately *24 hours* to complete. It contains an end of module test that must be passed with a 100% score; 27 CLPs are attained.

- **DAU Intermediate Systems Planning, Research, Development, and Engineering, Part I (SYS 202)**  
Description: This distance-learning course provides an understanding of how the DoD's systems engineering technical and technical management processes can be applied to a notional system within the context of the Integrated Defense Acquisition, Technology and Logistics Life Cycle Management System. Course content includes the scope and role of systems engineering and its major technical inputs and outputs, the key aspects of technical baselines, the role of technical reviews, and important design considerations.

This module takes approximately *30 hours* to complete. It contains an end of module test that must be passed with a 100% score; 30 CLPs are attained.

- **DAU Basic Information Systems Acquisition (IRM101)**  
Description: This course covers introductory-level concepts in DoD information systems acquisition management such as software acquisition/development risks, DoD regulatory and technical frameworks, software and system architectures, and software development life cycle and integration processes. Software standards, measurements, testing, security,

quality issues, process maturity, as well as best practices for the management of software-intensive systems are also reviewed.

This module takes approximately *35 hours* to complete. It contains an end of module test that must be passed with a 100% score; 35 CLPs are attained.

- **DAU Fundamentals of Test and Evaluation (TST 102)**

Description: This course covers fundamental principles of Test and Evaluation (T&E). It is designed to enhance the student's ability to function effectively as a T&E professional within the acquisition process as well as provide other acquisition personnel knowledge of T&E processes and activities. This course emphasizes basic T&E management and engineering principles, policies, and practices used by the DoD. The course addresses the various types of testing typically encountered during the DoD acquisition life cycle and the important role played by T&E as a feedback mechanism and risk reduction activity.

This module takes approximately *30 hours* to complete. It contains an end of module test that must be passed with a 100% score; 18 CLPs are attained.

- **DAU Intermediate Systems Acquisition, Part A (ACQ 201A)**

Description: This course is part one of two separate but interrelated portions: computer-based training (CBT) followed by a classroom seminar (ACQ 201B). Students may not attend the classroom portion until they have passed the CBT portion of the course. A common thread throughout both portions of the course will be the acquisition of a single, fictitious defense system: an unmanned aerial vehicle (UAV) equipped with munitions called the Firebird. The scenario of the Firebird is loosely based on real UAV programs, including current and future technology developments. Students will learn by completing a series of activities and exercises, which will require them to research appropriate references and apply knowledge to resolve dilemmas and make sound acquisition decisions. The Firebird scenario follows the evolution of a system as it moves from requirements generation through consideration of alternatives, planning, design, development, testing, production, and fielding. This course focuses on the comprehension and application levels of learning, building on the knowledge acquired in the ACQ101 course.

This module takes approximately *40 hours* to complete. It contains an end of module test that must be passed with a 100% score; 37 CLPs are attained.

- **AFIT Human Systems Integration in Capability Requirements<sup>1</sup> (SYS 261)**

Description: This is a live, in-residence course designed to equip the practitioner with the requisite procedural and declarative knowledge with regards to the relationship between Human Systems Integration and Systems Engineering from developmental planning and requirements generation perspectives.

Outcomes of this course are the application, analysis, and evaluation of the content necessary to ensure acquisition professionals and HSI Practitioners are prepared to

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<sup>1</sup> This course is for the HSI practitioners in requirements generation capacity

identify, recognize, and implement HSI into Air Force (AF) and Joint Department of Defense (DoD) systems.

This module takes 2 – 3 *days* of live training sessions to complete. It contains modules test that must be passed with a 100% score; 21 CLPs are attained, **or**

- **AFIT Human Systems Integration in Acquisition<sup>2</sup> (SYS 269)**

Description: This is a live, in-residence course designed to equip the practitioner with the requisite procedural and declarative knowledge with regards to the relationship between Human Systems Integration and Systems Engineering throughout the acquisition process.

Outcomes of this course are the application, analysis, and evaluation of the content necessary to ensure acquisition professionals and HSI Practitioners are prepared to identify, recognize, and implement HSI into Air Force (AF) and Joint Department of Defense (DoD) systems.

This module takes 2 – 3 *days* of live training sessions to complete. It contains modules test that must be passed with a 100% score; 21 CLPs are attained.

Necessary Training Courses for level III DoD HSI Practitioner; In addition to Level 1 & 2 Training:

- **DAU Intermediate Systems Acquisition, Part A (ACQ 201B)**

Description: This is the continuation of ACQ 201A as a live classroom seminar. A common thread throughout both portions of the course will be the acquisition of a single, fictitious defense system: an unmanned aerial vehicle (UAV) equipped with munitions called the Firebird. The scenario of the Firebird is loosely based on real UAV programs, including current and future technology developments. Students will learn by completing a series of activities and exercises, which will require them to research appropriate references and apply knowledge to resolve dilemmas and make sound acquisition decisions. The Firebird scenario follows the evolution of a system as it moves from requirements generation through consideration of alternatives, planning, design, development, testing, production, and fielding.

This module takes 5 *days* of live training sessions to complete. It contains an end of module test that must be passed; 34 CLPs are attained.

- **DAU Program Management Tools, Part I (PMT 251)**

Description: Program Management Tools provides application skills needed in a program office as an integrated product team lead. It is a follow-on course to ACQ 201B and is designed to enhance journeyman-level skills. This course prepares defense acquisition professionals for work in the Program Offices and for the Program Management Office Course.

This module takes approximately 50 *hours* to complete. It contains an end of module test that must be passed with a 100% score; 50 CLPs are attained.

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<sup>2</sup> This course is for the HSI practitioner in acquisition and sustainment capacity



- **DAU Program Management Tools, Part II (PMT 257)**

Description: Program Management Tools provides application skills needed in a program office as an integrated product team lead. It is a follow-on course to PMT 251 and is designed to enhance journeyman-level skills. This course prepares defense acquisition professionals for work in the Program Offices and for the Program Management Office Course.

This module takes approximately *30 hours* to complete. It contains an end of module test that must be passed with a 100% score; 43 CLPs are attained.

- **DAU Program Management Office, Part A (PMT 352A)**

Description: The Program Management Office Course, Part A, is the first part of the Level III certification course in the Program Management career field. It is the follow-on to ACQ 201B and PMT 257 and is designed to train Level II certified professionals to be effective leaders in a program office by honing analysis, synthesis, and evaluative skills.

This module takes approximately *50 hours* to complete. It contains an end of module test that must be passed with a 100% score; 22 CLPs are attained.

### 3 - Graduate level certificates from NPS and AFIT

#### Courses required for the NPS graduate certificate in Human Systems Integration:

*Prerequisites: Baccalaureate Degree, GPA of 2.2 or better, 2 or more pre-calculus courses with B or better average, Completion of DAU ACQ 101 and ACQ 201A. Waivers may be considered*

- **Introduction to Human Systems Integration (OA3411)**  
Description: The student will learn about the policies that govern HSI, the domains that comprise HSI, and the capabilities and limitations of humans in complex systems under a variety of stressful conditions.
- **Human Systems Integration in the Acquisition Lifecycle (OA3412)**  
Description: The student will learn how HSI practitioners work with developers, designers, program managers, logisticians, and engineers to influence the entire lifecycle of a system – from concept development through the operations and support phase.
- **Human Systems Integration Tools, Tradeoffs, and Processes (OA3413)**  
Description: An important task for HSI practitioners is to assist acquisition program leaders in making tradeoff decisions in a resource-constrained environment. This course provides you with the theories and tools to help you help them make informed decisions.
- **Human Systems Integration Case Studies and Applications (OA3414)**  
Description: The student will apply the learning from the previous three courses to evaluate historical case studies and to engage in HSI activities in typical acquisition systems.

*Eligible for this program: Government and affiliates; Tuition: \$2,000.00 per course for government personnel and \$2,200.00 per course for affiliates (government contractors)*

#### Courses required for the AFIT graduate certificate in Systems Engineering – Human Systems:

*Prerequisites: Baccalaureate degree in engineering or scientific field; specific undergraduate prerequisite course work in calculus, probability and statistics, and engineering design. An overall undergraduate GPA of 3.00 is desirable, but not required. Academic admission requirements may be waived at the discretion of the department on a case by case basis. Tuition: \$438 per credit hour in residence. Distance Learning Students - Certification Program \$438 per credit hour (currently not available for Human Systems students)  
The full certificate requires completion of the following four required courses and one of the listed elective courses.*

- **Systems Engineering Design (SENG 520)**  
Description: This course provides a broad introduction to the structured approach necessary for the design of complex systems. The formulation of systems problems and the approach to their solution will be emphasized. Basic mathematical techniques available to the systems engineer are presented. The design process will be illustrated through the review of past design efforts, and the application to a problem of current interest.  
Course credit hours: 4; Prerequisites: None.

- **Human Systems Integration (SENG 560)**

Description: A human-centered design approach (i.e., "system" includes people within an organization that apply technology to accomplish a task) is explored through readings, discussion and a project. Included are discussions of the Human Systems Integration domains (manpower, personnel, training, human factors, system safety, environment, safety, occupational health, and survivability) and a method for considering these domains within the Systems Engineering Lifecycle.

Course credit hours: 4; Prerequisites: None.

- **Introduction To Human Factors (HFEN 560)**

Description: This course examines the study and application of humans and the system interface, including the knowledge of human cognitive/social/physical behavior, capabilities, and limitations. Topics include anthropometrics, sensation-perception, decision-making, situational awareness, display/control design, warnings/alerts, automation, human error, and accident investigation. Numerous case studies are used to highlight course topics.

Course credit hours: 3; Prerequisites: None.

- **Special Study – Group Or Individual Capstone Project (SENG 798)**

Description: A design study on a topic of current Air Force interest (which may be classified) is selected as a class project. The class develops its own organizational structure to suit the problem, develops a statement of work and conducts the study. Progress reports and final reports are given to the sponsoring organization, as required. A formal written report is prepared by the group. This class may be either one or two quarters in length. If it extends over two quarters, no credit is given until the end of the last quarter. This course is similar to SENG 799, but is for non-thesis students.

Course credit hours: 4; Prerequisites: Must be enrolled in the graduate Systems Engineering or Systems Engineering – Human Systems certificate program.

### *Elective Course Descriptions*

- **Human Performance Measurement (HFEN 610)**

Description: Theories, concepts, and methods for measuring and evaluating human performance will be discussed with an emphasis on facilitating the design of systems having enhanced human performance and satisfaction. The student will gain practice in measuring human performance and applying the results to suggest and validate system design improvements. Influence of fatigue, environmental/task stressors, and social/team factors will be discussed.

Course credit hours: 4; Prerequisites: None

- **Human-Computer Interaction (HFEN 663)**

Description: This course examines various aspects of usability in terms of the interfaces between humans, computers, and the information upon which both depend. This course will give students a broad overview of many topics critical to understanding and evaluating usability of computer systems interfaces, and to topics critical to designing and developing interfaces that are usable by their intended audiences.

Course credit hours: 3; Prerequisites: HFEN 560

- **Human Interaction Technologies (HFEN 670)**

Description: Robust human-system interaction requires information flow between the system and human brain. This course will introduce technologies available to mediate this flow of information, discussing the important characteristics and considerations for input and output technologies. Emphasis will be provided on visual information processing and visual display design. Human auditory processing and various input device technologies and will also be discussed.

Course credit hours: 4; Prerequisites: HFEN 560

## 4 a – Master of Science from NPS (HSI)

### Courses required for the NPS Master of Science in Human Systems Integration:

*Prerequisites: Baccalaureate Degree, GPA of 2.2 or better, 2 or more pre-calculus courses with B or better average. Eligible for this program: Government and affiliates, Tuition: \$2,000.00 per course for government personnel. Waivers may be considered ([http://www.nps.edu/DL/Degree\\_Progs/MHSI.asp](http://www.nps.edu/DL/Degree_Progs/MHSI.asp))*

#### **Quarter 1 Fall**

- **Introduction to Human Systems Integration (OA3411)**  
Description: The student will learn about the policies that govern HSI, the domains that comprise HSI, and the capabilities and limitations of humans in complex systems under a variety of stressful conditions.
- **Acquisition of Defense Systems (MN3301)**  
Description: This course introduces the principles and concepts that underlie successful defense acquisition management. The course focuses on management of the acquisition process for defense systems from the development of an initial desired capability or need through design, development, production, fielding, sustainment, and disposal. Students gain an understanding of successful acquisition as an interdisciplinary activity through contributions and applications of principles from business, management, and technical disciplines. The course also emphasizes the statutory, regulatory, and policy environment of acquisition. Numerous case studies illustrate the application of concepts and principles in actual acquisition programs.

Prerequisite: None.

#### **Quarter 2 Winter**

- **Human Systems Integration in the Acquisition Lifecycle (OA3412)**  
Description: The student will learn how HSI practitioners work with developers, designers, program managers, logisticians, and engineers to influence the entire lifecycle of a system – from concept development through the operations and support phase.
- **Fundamentals of Systems Engineering (SE3100)**  
Description: Introduction to systems thinking and the processes of systems engineering. The course covers requirements generation, conceptual system design, preliminary systems architecture, comparison of alternatives, and basics of test and evaluation. Three different frameworks, including the DoD standard JCIDS, are presented.

#### **Quarter 3 Spring**

- **Human Systems Integration Tools, Tradeoffs, and Processes (OA3413)**  
Description: An important task for HSI practitioners is to assist acquisition program leaders in making tradeoff decisions in a resource-constrained environment. This course provides you with the theories and tools to help you help them make informed decisions.
- **Human Factors in Systems Design (OA3401)**  
Description: This course will provide an introduction to the field of human factors with an emphasis on military systems. Humans are the most important element of any military

system. Consequently, the design of effective systems must take into account human strengths and limitations as well as considerations of human variability. The course surveys human factors and human-centered design and system effectiveness and safety. Topics include human cognition and performance as they are influenced by physiological, anthropometric, and environmental considerations.

#### **Quarter 4 Summer**

- **Human Systems Integration Case Studies and Applications (OA4414)**  
Description: You will apply what you have learned in the previous three courses to evaluate historical case studies and to engage in HSI activities in typical acquisition systems.
- **Probability and Statistics for HSI and MOVES part 1 (OS3111)**  
Description: Non-calculus-based introduction in the context. Descriptive statistics and graphical techniques; probability rules including Bayes Rule and independence; discrete and continuous probability distributions, expected values, quantiles, variance, covariance, correlation, expected values, and variance of linear combinations of random variables, notably the sample mean; fundamentals of statistics in one-sample setting including the ideas of estimation, confidence intervals, and hypothesis testing; use and comparison of parametric and nonparametric approaches

#### **Quarter 5 Fall**

- **Individual Performance: Sensation, Perception, and Cognition (O4401)**  
Description: This course provides the methods, theories, and applications of psychophysics and the physiological bases for sensory processes. The theoretical and empirical foundations for perception will be addressed, along with perceptual learning and adaptation. Cognition, decision making, and motor output will also be covered. An overview will be given of the relationship between sensory/perceptual processes and display technology including augmented displays, human-in-the-loop simulators, virtual environments, and more traditional system displays. Military applications will be a consistent referent.
- **Statistics and Design of Experiments (OS3112)**  
Description: This course reviews the basic concepts of data collection, data description, and graphical displays. It covers fundamentals of experimental design and analysis of categorical data. Students will learn how to set and analyze experiments using basic experimental design starting with two-sample methods and advancing to designs such as factorials, fractional factorials, and randomized block designs. Designs appropriate for human research (such as repeated measure designs) and/or large-scale simulation experiments (such as Latin hypercube designs) are included. Parametric and nonparametric approaches are compared and contrasted. Methods for analyzing categorical data are introduced: one- and two-sample inference for proportions, and contingency tables. Datasets and motivational examples are drawn from recent research relevant to HSI and/or MOVES.

### **Quarter 6 Winter**

- **Survivability, Habitability, Environmental Safety, & Occupational Health (OA4406)**  
Description: This course will provide an overview of personnel survivability methodology in safety, health hazards, and occupational health concepts. The evaluation of new and modified military systems and equipment for safety and potential health hazards will be addressed through reviewing models, methods, and processes available to help identify and mitigate the potential harm from accidents and hostile environments. Occupational health concerns will be addressed and methods of alleviating or minimizing workplace hazards will be analyzed. Risk analysis and mitigation models also will be examined for their contribution to increased safety and operational effectiveness.
- **Cost Estimation (OA4702)**  
Description: Advanced study in the methods and practice of systems analysis with emphasis on cost analysis; cost models and methods for total program structures and single projects; relationship of effectiveness models and measures to cost analysis; public capital budgeting of interrelated projects; detailed examples from current federal practices.

Prerequisite: OA3103 (OS3080 satisfies this prerequisite.)

### **Quarter 7 Spring**

- **Training & Simulation (OA4402)**  
Description: This course will provide an overview of learning principles, training system development and evaluation, the Instructional System Development approach, Navy training practices, and simulation training systems. Tradeoffs among personnel selection, training, and other domains of HSI will be addressed.
- **Team Performance and Decision Making (OA4408)**  
Description: This course addresses current topics and advances in the understanding of team performance, decision-making, socio-technical issues, and team performance measurement. Key issues will be covered such as verbal and nonverbal communications, shared mental models, dynamic task allocation, team training, action coordination, teamwork breakdowns, and team organizational structure.

### **Quarter 8 Summer**

- **Systems Test & Evaluation (OA4603)**  
Description: TBD
- **Probability and Statistics for HSI and MOVES part 2 (OS3111)**  
Description: Non-calculus-based introduction in the context. Descriptive statistics and graphical techniques; Probability rules including Bayes Rule and independence; discrete and continuous probability distributions, expected values, quantiles, variance, covariance, correlation, expected values, and variance of linear combinations of random variables, notably the sample mean; fundamentals of statistics in one-sample setting including the ideas of estimation, confidence intervals, and hypothesis testing; use and comparison of parametric and nonparametric approaches.

## **4 b 1 – Master of Science from AFIT (Systems Engineering –Human Systems)**

### Courses required for the AFIT Master of Science in Systems Engineering Human Systems:

*Prerequisites: Baccalaureate degree in any engineering discipline (Aeronautical, Astronautical, Aerospace, Chemical, Civil, Computer, Industrial, Mechanical, Electrical, or Systems Engineering) or a degree in Engineering Science. A degree in science (e.g. physics), math or computer science will be considered for admission to a non-ABET Master of Science program on a case-by- case basis. Courses in calculus-based physics and dynamical systems (circuits or engineering dynamics) are required. GPA Required: Overall - 3.0; Math - 3.0; Major - 3.0. Academic admission requirements may be waived at the discretion of the department on a case by case basis.*

*The GSE program requires a minimum of 48 credit hours covering the following program elements: core courses, mathematics or math science requirement, a distribution course requirement, engineering depth to include 12 or more hours in the Human Systems sequence, and an individual thesis or group project.*

*Tuition: \$ Residential Students - Both master's and doctoral programs \$344 per credit hour*

*Distance Learning Students - Master's Degree Program \$525 per credit hour (currently not available for Human Systems students) (<http://www.afit.edu/en/env/systemsengineering.cfm>)*

### *Systems Engineering Core*

- **Systems Engineering Design (SENG 520)**

Description: This course provides a broad introduction to the structured approach necessary for the design of complex systems. The formulation of systems problems and the approach to their solution will be emphasized. Basic mathematical techniques available to the systems engineer are presented. The design process will be illustrated through the review of past design efforts, and the application to a problem of current interest.

Course credit hours: 4; Prerequisites: None; Terms Offered: Fall, Summer

- **Engineering Software-Intensive Systems (CSCE 590)**

Description: This course explores the unique challenges faced by teams engineering large-scale software-intensive systems (i.e., systems which have a large software component). Techniques in software requirements elicitation, object-oriented design, and quality assurance are presented in the context of an iterative software development process. Particular attention is paid to object-oriented modeling using the Unified Modeling Language (UML) and real-world case studies of software development within commercial and government organizations. Techniques to facilitate the engineering of reliable and secure software systems are introduced. This course is an introduction to software engineering for experienced engineers whose area of expertise is outside computer science. This course will enable them to more effectively communicate with software users and developers and make sound management decisions with respect to software-intensive systems development.

Credit Hours: 4; Prerequisites: None; Terms Offered: Summer Fall (DL), Winter.



- **Systems Engineering Management (SENG 610)**

Description: Designator change from SENG 510 to SENG 610. This is a graduate course primarily intended for the Master of Science program in Systems Engineering. It will provide an overview of the Systems Engineering process and selected topics from Systems Engineering Management. Topics include a model based-approach to key systems engineering design activities, process modeling, requirements analysis and functional allocation, trade-off analysis, and management of cost, schedule and risk. As part of the Systems Engineering core, it is complemented by SENG 520, Systems Engineering Design, SENG 540, Systems Architecture, and CSCE 593, Introduction to Software Engineering.

Credit Hours: 4; Prerequisites: SENG 520; Terms Offered: Spring, Winter.

- **System Architecture (SENG 640)**

Description: This course provides the foundations for developing and evaluating architectures for systems of systems. The process for generating a functional, physical and operational architecture from a top level operations concept will be developed.

Credit Hours: 4; Prerequisites: SENG 520, or Permission of Instructor; Terms Offered: Fall, Winter

- **Introduction to Human Systems Integration (SENG 560)**

Description: This is an overview course on the principles and fundamentals of Human Factors and ergonomics. The objectives are to gain an understanding of how humans process sensory stimuli, how to design displays and systems to best match these capabilities and limitations, and how operators in military environments perform their tasks with various displays.

Course credit hours: 4; Prerequisites: None; Terms Offered: Fall

### ***Mathematic Requirements***

*Students must complete at least one course in graduate mathematics or math science (3-4 credit hours). Students without a background course in probability and statistics must take a course in this area. Appropriate probability and statistics courses include:*

- **Introduction to Probability and Statistics (STAT 585 required)**

Description: Basic concepts of probability and statistics with applications are covered. Topics include permutations and combinations, random variables, probability distributions, estimation and confidence intervals, hypothesis testing.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Winter, Summer, Fall

### *Human Systems Specialization*

- **Introduction to Human Factors (HFEN 560)**

Description: This course examines the study and application of humans and the system interface, including the knowledge of human cognitive/social/physical behavior, capabilities, and limitations. Topics include anthropometrics, sensation-perception, decision-making, situational awareness, display/control design, warnings/alerts, automation, human error, and accident investigation. Numerous case studies are used to highlight course topics.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Winter

- **Human Performance Measurement (HFEN 610)**

Description: Theories, concepts, and methods for measuring and evaluating human performance will be discussed with an emphasis on facilitating the design of systems having enhanced human performance and satisfaction. The student will gain practice in measuring human performance and applying the results to suggest and validate system design improvements. Influence of fatigue, environmental/task stressors, and social/team factors will be discussed.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Winter

- **Human Interaction Technologies (HFEN 670)**

Description: Robust human-system interaction requires information flow between the system and human brain. This course will introduce technologies available to mediate this flow of information, discussing the important characteristics and considerations for input and output technologies. Emphasis will be provided on visual information processing and visual display design. Human auditory processing and various input device technologies and will also discussed.

Credit Hours: 4; Prerequisites: HFEN 560; Terms Offered: Spring

- **Human-Computer Interaction (HFEN 633)**

Description: This course covers the principles of human-computer interaction in the design and evaluation of useful, usable interfaces as well as the social consequences of technological innovations. Topics include the joint performance of tasks by humans and machines; the structure of communication between human and machine; human capabilities to use machines; algorithms and programming of the interface itself; engineering concerns that arise in designing and building interfaces; the process of specification, design, and implementation of interfaces; and design trade-offs.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Summer

- **Human Computer Interface (HFEN 699)**

Description: Optional special topics studies in Human Systems.

Credit Hours: Variable; Prerequisites/Co-requisites: None; Terms Offered: TBD

- **Thesis or Group Design Study (SENG 799)**

Description: A design study on a topic of current Air Force interest (which may be classified) is selected as a class project. The class develops its own organizational structure to suit the problem, develops a statement of work and conducts the study.

Credit Hours: 12; Prerequisites/Co-requisites: Enrollment in Systems Engineering program; Terms Offered: All

## **4 b 2 – AFIT Master of Science (Intermediate Development in Systems Engineering –Human Systems specialization)**

### Required Courses

*The AFIT Master of Science in Systems Engineering for Intermediate Development Education (ISE) program can be completed in-residence only. Full-time in-residence students typically complete 48 hours of graduate study within a 12 month program. The following program includes the recommended course work for an Intermediate Development Education Student in Systems Engineering with a Human Systems Specialization. Potential students must have completed a Bachelor of Science in Engineering, Computer Science, or related field and have the appropriate level of practical experience.*

### *Systems Engineering Core*

- **Systems Engineering Design (SENG 520)**

Description: This course provides a broad introduction to the structured approach necessary for the design of complex systems. The formulation of systems problems and the approach to their solution will be emphasized. Basic mathematical techniques available to the systems engineer are presented. The design process will be illustrated through the review of past design efforts, and the application to a problem of current interest.

Course credit hours: 4; Prerequisites: None; Terms Offered: Fall, Summer

- **Engineering Software-Intensive Systems (CSCE 590)**

Description: This course explores the unique challenges faced by teams engineering large-scale software-intensive systems (i.e., systems which have a large software component). Techniques in software requirements elicitation, object-oriented design, and quality assurance are presented in the context of an iterative software development process. Particular attention is paid to object-oriented modeling using the Unified Modeling Language (UML) and real-world case studies of software development within commercial and government organizations. Techniques to facilitate the engineering of reliable and secure software systems are introduced. This course is an introduction to software engineering for experienced engineers whose area of expertise is outside computer science. This course will enable them to more effectively communicate with software users and developers and make sound management decisions with respect to software-intensive systems development.

Credit Hours: 4; Prerequisites: None; Terms Offered: Summer Fall (DL), Winter.

- **Systems Engineering Management (SENG 610)**

Description: Designator change from SENG 510 to SENG 610. This is a graduate course primarily intended for the Master of Science program in Systems Engineering. It will provide an overview of the Systems Engineering process and selected topics from Systems Engineering Management. Topics include a model based-approach to key systems engineering design activities, process modeling, requirements analysis and functional allocation, trade-off analysis, and management of cost, schedule and risk. As part of the Systems Engineering core, it is complemented by SENG 520, Systems

Engineering Design, SENG 540, Systems Architecture, and CSCE 593, Introduction to Software Engineering.

Credit Hours: 4; Prerequisites: SENG 520; Terms Offered: Spring, Winter

- **System Architecture (SENG 640)**

Description: This course provides the foundations for developing and evaluating architectures for systems of systems. The process for generating a functional, physical and operational architecture from a top level operations concept will be developed.

Credit Hours: 4; Prerequisites: SENG 520, or Permission of Instructor; Terms Offered: Fall, Winter

- **Introduction to Human Systems Integration (SENG 560)**

Description: This is an overview course on the principles and fundamentals of Human Factors and ergonomics. The objectives are to gain an understanding of how humans process sensory stimuli, how to design displays and systems to best match these capabilities and limitations, and how operators in military environments perform their tasks with various displays.

Course credit hours: 4; Prerequisites: None; Terms Offered: Fall

*Mathematic Requirements*

- **Introduction to Probability and Statistics (STAT 585)**

Description: Basic concepts of probability and statistics with applications are covered. Topics include permutations and combinations, random variables, probability distributions, estimation and confidence intervals, hypothesis testing.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Winter, Summer, Fall

*Human Systems Core*

- **Introduction to Human Factors (HFEN 560)**

Description: This course examines the study and application of humans and the system interface, including the knowledge of human cognitive/social/physical behavior, capabilities, and limitations. Topics include anthropometrics, sensation-perception, decision-making, situational awareness, display/control design, warnings/alerts, automation, human error, and accident investigation. Numerous case studies are used to highlight course topics.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Winter

- **Human Performance Measurement (HFEN 610)**

Description: Theories, concepts, and methods for measuring and evaluating human performance will be discussed with an emphasis on facilitating the design of systems having enhanced human performance and satisfaction. The student will gain practice in

measuring human performance and applying the results to suggest and validate system design improvements. Influence of fatigue, environmental/task stressors, and social/team factors will be discussed.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Winter

- **Human Interaction Technologies (HFEN 670)**

Description: Robust human-system interaction requires information flow between the system and human brain. This course will introduce technologies available to mediate this flow of information, discussing the important characteristics and considerations for input and output technologies. Emphasis will be provided on visual information processing and visual display design. Human auditory processing and various input device technologies and will also discussed.

Credit Hours: 4; Prerequisites: HFEN 560; Terms Offered: Spring

- **Human-Computer Interaction (HFEN 633)**

Description: This course covers the principles of human-computer interaction in the design and evaluation of useful, usable interfaces as well as the social consequences of technological innovations. Topics include the joint performance of tasks by humans and machines; the structure of communication between human and machine; human capabilities to use machines; algorithms and programming of the interface itself; engineering concerns that arise in designing and building interfaces; the process of specification, design, and implementation of interfaces; and design trade-offs.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Summer

- **Human Computer Interface (HFEN 699)**

Description: Optional special topics studies in Human Systems.

Credit Hours: Variable; Prerequisites/Co-requisites: None; Terms Offered: TBD

- **Group Project (SENG 799)**

Description: A DoD Human Systems related topic.

Credit Hours: 9; Prerequisites/Co-requisites: Enrollment in Systems Engineering program; Terms Offered: All

## **4 b 3 – AFIT Master of Science (Engineering and Technology Management– Human Systems specialization)**

### Required Courses

*The AFIT Master of Science in Engineering and Technology Management (GEM) program can be completed in-residence as either a full-time or part-time program. Full-time in-residence students often complete up to 72 hours of graduate study within an 18 month program. However, all students are required to complete a minimum of 48 credit hours for degree completion. The following program includes the recommended course work for a Graduate Student in Engineering and Technology Management with a Human Systems Specialization. Potential students must have completed a Bachelors degree in a technical area or with significant technical content, or have experience in a technical field. Other eligibility requirements apply.*

#### ***Technology Management Core***

- **Management and Behavior in Organizations (ORSC 542)**

Description: This course will give the student an in-depth understanding of organizational behavior, organization theory, and management theory. Topics include, but are not limited to, classical and neoclassical organization and management theory, study of organizations, organizational culture, individual behavior, motivation, rewards, organizational behavior, politics, leadership, organizational structure and design, job and organizational design, communication and information in the postmodernist era, decision-making process, and organizational change.

Course credit hours: 4; Prerequisites: None; Terms Offered: Fall, Winter

- **Systems Engineering Process and Management (SENG 610)**

Description: Designator change from SENG 510 to SENG 610. This is a graduate course primarily intended for the Master of Science program in Systems Engineering. It will provide an overview of the Systems Engineering process and selected topics from Systems Engineering Management. Topics include a model based-approach to key systems engineering design activities, process modeling, requirements analysis and functional allocation, trade-off analysis, and management of cost, schedule and risk. As part of the Systems Engineering core, it is complemented by SENG 520, Systems Engineering Design, SENG 540, Systems Architecture, and CSCE 593, Introduction to Software Engineering.

Credit Hours: 4; Prerequisites: SENG 520; Terms Offered: Winter, Spring

- **Engineering Economics and Decision Analysis (EMGT 550)**

Description: This course studies the analytical techniques necessary to optimize the economic outcome of technical and managerial decisions. Traditional engineering economic concepts such as basic cost concepts and time value of money are reviewed before presenting more complex concepts including comparison of alternatives, economic analysis, capital budgeting, analysis of risk and uncertainty, and decision models.

Credit Hours: 3; Prerequisites: MATH 291 or Instructor permission; Terms Offered: Summer

- **Business Process Improvement (IMGT 669)**

Description: This course introduces students to the concepts of business process improvement, including the most popular approach to this concept, Business Process Reengineering, by Hammer and Champy, and principles of lean thinking. This course will cover the historical reasons that organizations are structured the way they are. The students learn to re-conceptualize the organization in terms of business processes and learn how to use that knowledge to improve organizational effectiveness and efficiency. The students will learn to analyze an organization from this standpoint, and will learn to use these concepts to re-design the organization in ways that lead to doing more with less, and at the same time improving the services provided by the organizations' customers.

Credit Hours: 4; Prerequisites: None; Terms Offered: Summer, Fall

*Methods Requirements*

- **Applied Statistics (STAT 535)**

Description: Statistical methods needed to gather, interpret and apply data in the decision-making process are presented. Concepts discussed include methods on how to: specify what data is wanted, collect data, extract information from existing sources of data, test the validity of key concepts, make intelligent estimates of major problem parameters, and relate one decision variable to another (ANOVA and regression).

Credit Hours: 3; Prerequisites/Co-requisites: None; Terms Offered: Winter, Fall

- **Research Methods (RSCH 630)**

Description: Research methods is one of the foundation courses in a management-related Master of Science degree program. It provides an understanding of the basic methods of conducting research and concepts related to scientific inquiry. This course is designed to advance students along the research process by introducing the basic tools needed to critically analyze claims made through the written body of knowledge and determine the degree to which these claims are valid. As such, the course should help students not only in conducting research, but also in judging the validity of any claims made verbally or in writing. An important part of the process is an understanding of the statistical procedure used to analyze the data (such as linear regression reliability of measure, correlation, and causality) to support drawing conclusions about the research question. Additionally, the course will provide a foundation for students in designing and conducting their own research projects and help them determine how close to the truth they have come in their own efforts.

Credit Hours: 4; Prerequisites/Co-requisites: STAT 535; Terms Offered: Winter, Spring, Summer



### *Human Systems Core*

- **Introduction to Human Systems Integration (SENG 560)**

Description: This is an overview course on the principles and fundamentals of Human Factors and ergonomics. The objectives are to gain an understanding of how humans process sensory stimuli, how to design displays and systems to best match these capabilities and limitations, and how operators in military environments perform their tasks with various displays.

Course credit hours: 4; Prerequisites: None; Terms Offered: Fall

- **Introduction to Human Factors (HFEN 560)**

Description: This course examines the study and application of humans and the system interface, including the knowledge of human cognitive/social/physical behavior, capabilities, and limitations. Topics include anthropometrics, sensation-perception, decision-making, situational awareness, display/control design, warnings/alerts, automation, human error, and accident investigation. Numerous case studies are used to highlight course topics.

Credit Hours: 3; Prerequisites/Co-requisites: None; Terms Offered: Winter

- **Human Performance Measurement (HFEN 610)**

Description: Theories, concepts, and methods for measuring and evaluating human performance will be discussed with an emphasis on facilitating the design of systems having enhanced human performance and satisfaction. The student will gain practice in measuring human performance and applying the results to suggest and validate system design improvements. Influence of fatigue, environmental/task stressors, and social/team factors will be discussed.

Credit Hours: 4; Prerequisites/Co-requisites: None; Terms Offered: Winter

- **Human-Computer Interaction (HFEN 663)**

Description: This course covers the principles of human-computer interaction in the design and evaluation of useful, usable interfaces as well as the social consequences of technological innovations. Topics include the joint performance of tasks by humans and machines; the structure of communication between human and machine; human capabilities to use machines; algorithms and programming of the interface itself; engineering concerns that arise in designing and building interfaces; the process of specification, design, and implementation of interfaces; and design trade-offs.

Credit Hours: 3; Prerequisites/Co-requisites: None; Terms Offered: Summer

- **Human Interaction Technologies (HFEN 670)**

Description: Robust human-system interaction requires information flow between the system and human brain. This course will introduce technologies available to mediate this flow of information, discussing the important characteristics and considerations for

input and output technologies. Emphasis will be provided on visual information processing and visual display design. Human auditory processing and various input device technologies and will also discussed.

Credit Hours: 4; Prerequisites: HFEN 560; Terms Offered: Spring

- **Thesis (RDMT 799)**

Description: An in-depth study of a research topic selected from a wide variety of problems of current interest to the Air Force, with the results presented in a formal thesis written under the supervision of a departmental professor. An oral presentation and defense of the research is required.

Credit Hours: 12; Prerequisites/Co-requisites: Enrollment in Systems Engineering program; Terms Offered: All

## 5 – US Army MANPRINT

### Manpower and Personnel Integration Training (Human Systems Integration); Familiarization and Practitioner Courses:

*Prerequisites: The course is designed for military, civilian, academia and contractor personnel with responsibilities in MANPRINT and/or the associated 7 domains. (<http://www.manprint.army.mil/manprint/training.html>) Point of Contact is Taylor Jones, 256-508-0022, [lauris.t.jones2.civ@mail.mil](mailto:lauris.t.jones2.civ@mail.mil)*

#### **Tuesday of the 2<sup>nd</sup> Week of every month**

- **MANPRINT Familiarization Course**

Description: Provides selective information on the MANPRINT process that is pertinent to the target audience scheduled to attend a given class. Course length is 2.5 hrs. and content may be customized with topics requested by agency representatives and coordinated with the course administrator.

This short course is available at Huntsville / Redstone Arsenal and Fort Rucker locations; however, it is also provided via telecom and printed media upon request for distance learning needs. There is no charge for attendance. Students receive a Department of the Army Certificate of Training (DA Form 87), which may be used to gain ATTRS or CEU credits.

#### **Projected availability is in FY 14**

- **MANPRINT Acquisition Practitioner's (MAP) Course**

Description: Expands the MANPRINT Familiarization course's scope; thus superseding the defunct MANPRINT Applications Course.

Course length is projected to be 8 hrs. Initial course is rollout is expected in mid-march at Huntsville / Redstone Arsenal

## **Review and Comment Opportunity**

The point of contact for this effort is Maj Jeffrey Scott, USAF: [hsi.workflow@pentagon.af.mil](mailto:hsi.workflow@pentagon.af.mil)

Reviewers may request a soft copy of this document (Adobe PDF) and Comment Resolution Matrix (Microsoft Word).

Late or incomprehensible submissions are subject to categorical exclusion. The due date is 60 days after publication, June 28, 2012.

Each reviewing organization should internally consolidate and reconcile comments to ensure that the comments provided are without conflict and represent the corporate or organizational opinion. Each reviewing organization should identify a single point of contact to ensure effective communication.

Comments will be evaluated, and that evaluation will be documented. Responses will be returned to the reviewing organization. Timeliness is a goal, but a specific response time cannot be guaranteed.

Comments on the document shall be provided in a Microsoft Word document or Excel spreadsheet as shown below.



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Proposed Requirements for the DoD Human Systems Integration Course Catalogue

Please return completed CRM spreadsheet to the Air Force HSI workflow inbox: [hsi.workflow@pentagon.af.mil](mailto:hsi.workflow@pentagon.af.mil)

Item #	Org/ Reviewer	Type (*C/S/A)	Page	Para	Line #	Comment	Rationale	Resolution (**A/R/P)
1								
2								
3								
4								
5								
6								
7								

**\* Comment Types:**

CRITICAL -- Critical comments are major deficiencies that will result in a non-concur. Detailed rationale must be provided. Comment must be resolved before final approval.

SUBSTANTIVE -- Substantive comments are provided because sections in the document appear to be or are potentially unnecessary, incorrect, incomplete, misleading, confusing, or inconsistent with other sections.

ADMINISTRATIVE -- Administrative comments correct what appear to be typographical, grammatical, or formatting errors.

**\*\* Resolution Actions:**

Accept/Reject/Partial (A/R/P) are to be used by the document sponsor for comment resolution/adjudication. This format will allow the document sponsor to accept, reject, or partially accept/reject or modify each comment.