



Catalog of Courses

Aimed at Professionals, Helping to Grow in Knowledge and Capability

Our courses fit within a robust structure of systems engineering and technical management, taught by experts with decades of experience and international reputation. The structure is a synthesis of the best worldwide standards: ISO-15288, ANSI/EIA-632, IEEE-1220, MIL-STD-499C, and CMMI.

Select one or more of the five general systems engineering courses for end-to-end training on systems engineering. These general courses are appropriate for technical or supervisory people with a wide variation of experience level. Course instructional level is adapted to the level of the participants and can be introductory (teaching basic processes) or advanced (discussing the depth of the processes to understand the thoughts and ideas behind them).

The remaining courses are advanced courses in specific systems engineering activities.

Course Name	Days				
	½	1	2	3	4
◆ Applied Systems Engineering					◆
◆ Systems of Systems				◆	
◆ Engineering of Systems for Navy Interoperability				◆	
◆ Fundamentals of Systems Engineering			◆		
◆ Systems Engineering for SMEs			◆		
◆ Requirements Development			◆		
◆ Architecting with DODAF			◆		
◆ System Architecting		◆			
◆ Measurable Systems Engineering		◆			
◆ Effective Design Reviews	◆				
◆ Technical Management Using a SEMP				◆	
◆ Risk and Opportunity Management				◆	
◆ Planning and Controlling Collaborative Teams		◆			
◆ Project Scope Management				◆	
◆ Principles of Test and Evaluation			◆		
◆ Test Design and Analysis				◆	

This catalog contains short descriptions of each course listed above. Further information may be found at <http://www.hcode.com/courses.htm>, including downloadable copies of course information flyers.

General Systems Engineering Courses

Applied Systems Engineering

Covers the entire scope of system development from a glimmer in the eye to a completed system. Emphasis on the thoughts and concepts that underlie systems engineering processes. Combination of lecture and exercises to drive home the key points. Entertaining, dynamic, and useful, this course provides concepts and methods that you can take to your current project today, to improve the quality of your system products.

Four days v6.7

- Working with complexity
- A systems engineering model
- Operational definition
- Requirements definition
- Solution architecting
- System realization
- Technical evaluation
- Technical management
- ***Small groups build interoperating robots to solve a larger problem***

Systems of Systems

Complex systems of systems are created through computer networking in ways not available ten years ago. Systems engineers now have the responsibility to create systems of unprecedented scope and complexity. This course covers sound collaborative systems engineering processes to handle the challenges of complex systems of systems. Architectural design methods using patterns, heuristics, and the DODAF. Integration, collaboration, and T&E methods to work with evolutionary development of enterprises.

Three days v2.0

- System of systems challenges
- Architecting solutions (capabilities engineering, frameworks, patterns)
- Integration solutions (interfaces, coupling, COTS, legacy)
- Collaboration solutions (control and coordination of large disjoint teams)
- T&E solutions (operational testing, emergent behavior, test responsibility)
- ***Small groups work with collaborative emergent robotics to build a real system of systems.***

Engineering of Systems for Navy Interoperability

Practical methods to achieve interoperable systems through application of systems engineering methods at multiple system-of-systems levels. Covers interoperability from viewpoints of system acquisition, platform integration, battle group integration, and Navy systems-of-systems. Similar structure to “Applied Systems Engineering,” but focused on examples of current Navy acquisition and development efforts that show both good and bad interoperability practices.

Three days v6.6

- Working with complexity
- Current DoD interoperability methods
- Operational definition
- Requirements definition
- Solution architecting
- System realization
- Technical evaluation
- Technical management
- ***Small groups build interoperating robots to solve a larger problem***

Fundamentals of Systems Engineering

A short course to see and practice the basics of building successful systems. This course is a short version of our “Applied Systems Engineering” course, using a practical group exercise. It is an excellent way to get the concepts and methods that you can use, in only two days.

Two days v1.0

- A systems engineering model
- Where do requirements come from?
- Where does a solution come from?
- Ensuring technical quality
- Technical management
- Small group work on segments of a new automobile development

Systems Engineering for Small and Medium Enterprises (SMEs)

This course is aimed at the SMEs who wish to explore what easy benefits they can get from systems engineering. It quickly describes the thought processes and then focuses on specific techniques that can be used immediately. The focus is on practical exercises for those techniques, and on a self-selected case study to apply the techniques to a real-world problem.

Two days v1.0

- Why systems engineering?
- A systems engineering model
- Defining the need
- Using requirements
- Architecting a solution
- Design product quality
- Case studies selected by participants

Requirements Definition Courses

Requirements Development

Concepts of requirements as system definition, as configuration management, and as an engineering tool. Methods to determine the operational need, analyze missions, define functions, write requirements, analyze requirements, and allocate requirements. Includes frequent class exercises, including exercises in functional flow block diagrams, data flow diagrams, and object-oriented analysis. Includes case study that carries through the major steps in defining and allocating requirements.

Two days v1.3

- Requirements overview
- Defining the need
- Defining requirements
- Requirements analysis
- Requirements allocation
- Case study
- Requirements tools

Solution Architecting Courses

Architecting with DODAF

The DoD Architecture Framework is one of several frameworks used today to work with complexity. Among the frameworks, DODAF provides the richest set of products, allowing users to view a complex system from many different viewpoints. This course provide knowledge and exercises at a practical level in the use of the DODAF. You will learn about architecting processes, methods and thought patterns. You will practice architecting by creating DODAF representations of a familiar, complex system-of-systems. By the end of this course, you will be able to use DODAF effectively in your work.

Two days v2.0

- Meaning of architecture
- Architectural frameworks – DODAF, Zachman, FEAF
- Design patterns
- DODAF overview and products
- Operational definition products
- Technical definition products
- Migration definition products

This course is filled with practical exercises to learn how to use DODAF

System Architecting

System architecting is a creative art that develops the arrangement of components and relationships to build a system. System architecting involves heuristic rules and patterns recognizable by architects but difficult to codify. This tutorial shows the basic thought patterns behind system architecting, with some practice in identifying and using patterns effectively to develop an architecture. One day will not make you an expert in architecting, but it will provide you the starting point to develop effective techniques.

One day v1.0

- Meaning of architecture
- Architectural frameworks – DODAF, Zachman, FEAF
- Design patterns
- Constitutions
- Evaluating architectures
- Architectural issues in design

Technical Evaluation Courses

Measurable Systems Engineering

Covers the topic of measuring systems engineering from beginning to end, including descriptions of the scope of measurement, effective methods and metrics, and expected quantitative relationships. At each step, the course includes description of common pitfalls and how to avoid them.

One day v3.0

- Process implementation
- Systems engineering process
- Statistical data collection
- Measurement methods
- Systems engineering metrics
- Quantitative realationships
- Group case study

Effective Design Reviews

Design reviews from beginning to end, emphasizing their contribution to quality control. It starts with explanations of the goals and types of design reviews and then walks through the steps to hold an effective review. At each step, the course includes description of common pitfalls and how to avoid them.

Half day v1.0

- Design review goals
- Types of design reviews
- Preparation
- Conducting the review
- After the review

Technical Management Courses

Technical Management Using a SEMP

Without a well-considered, documented, articulated plan, a system development effort can easily founder on the complexity of the many technical issues. The plan provides the means to put each issue in context and ensure that each gets the attention it deserves. This course introduces participants to the processes that support planning, development and execution of a SEMP. Includes both project planning and project execution, together known as technical management.

Three days v3.0

- Technical plan development
- Patterns for planning
- Defining technical work
- Tailoring plans
- Space Habitat case study
- Technical plan execution
- Scope control
- Technical reviews
- Technical control processes
- Technical assessment
- Planning documentation – the SEMP

Risk and Opportunity Management

Learn how to manage risks while seeking the opportunities they offer. Covers risk/opportunity identification, qualitative and quantitative methods to analyze them, and mitigation/action plans. Review of essential probability theory, psychological aspects, project planning. Uses a consistent case study throughout in which you practice the methods taught. Practical course with tools you can use today.

Three days v2.0

- Managing uncertainty
- Practical probability theory
- Risk identification
- Qualitative analysis
- Quantitative analysis
- Risk response planning
- Risk monitoring and control
- Implementing risk management

Planning and Controlling Collaborative Teams

Techniques for the development of dispersed, collaborative teams. Covers team structure, team development, human problems analysis, multicultural teams, cohesion techniques, team communications, and communications structure analysis.

One day v2.1

- Team structures, development
- Human problems analysis
- Multicultural teams
- Cohesion techniques
- Team communications

Scope Management Courses

Project Scope Management

Essential methods to ensure that your project performs only the expected work and produces the expected products. Covers scope definition, detailed project planning, creation of milestone schedules, event planning and task networks, integration management, and scope control. Case study work through the whole course brings the methods into practical use.

Three days v1.0

- Integration management
- Scope management
- Scope definition
- Performance-based specification
- Project planning
- Work breakdown structures
- Network scheduling, estimation
- Scope control

Verification and Validation Courses

Principles of Test and Evaluation

Overview of test and evaluation from product design through operation. Emphasis on application of T&E to complex system products. Covers types of testing and types of evaluation. Verification versus validation, with methods for each. Test requirements, test planning, integration testing, test conduct, data collection, analysis, and reporting. Aimed at the test engineer, design engineer, or system engineer who needs to know more about product proof..

Two days v2.1

- What is test & evaluation?
- Test & evaluation model
- Test requirements definition
- Test planning
- Integration testing
- Test conduct
- Data collection, analysis & reporting

Test Design and Analysis

Analytical and design methodology taught from a layman's viewpoint. Analytical and design methodology taught from a layman's viewpoint. The focus of the course is giving individuals practical insights into how to acquire and use data to make sound management and technical decisions in support of a development program. Numerous examples and test design or analysis "traps or pitfalls" are highlighted.

Three days v2.0

- Concepts and context of T&E
- Defining needs and requirements
- Issues, criteria and measures
- Designing evaluations and tests
- Conducting tests
- Evaluation
- Special types and best practices