Honourcode, Inc.

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Requirements Development & Management

A 3-Day Course

Building Requirements that Effectively Communicate and Guide

One of the most significant impacts a systems engineer can have on a project is to ensure the successful identification, analysis, allocation and management of requirements. This course provides both lecture and practical work on the creation and use of requirements in a system development.

The course begins with an overview of the purpose and use of requirements. We identify the possible sources of requirements, and how to define requirements from each type of source. We teach how to write requirements, with practical hands-on practice on each type of requirement. We also focus on the entire set of requirements, with methods to graphically analyze the requirements to ensure completeness, correctness, and cohesion. We teach requirements allocation, how to decompose high-level requirements into lower-level requirements that create meaningful practical specifications for the system components. Finally, we look at the structure and tools for requirements management, to ensure that all requirements are met and that non-required features are not created.

The proper use of requirements is one of the core tools of complex systems engineering. From beginning to end, good systems engineers use requirements as the primary definition for the system and its elements, to help the product system:

- Meet the operational and customer needs
- Fit within the intended system environment
- Provide sufficient robustness and reliability
- Offer appropriate flexibility
- Meet the entire life cycle

***Practice all the methods in collaborative work on a creative system exercise. Define and quantify the operational need, write requirements, do graphical requirements analysis, and allocate the requirements into an architecture.*.**

This course helps to meet these goals through more effective requirements.

***You should attend this course if you are*:**

- Faced with requirements challenges or program overruns
- Designing or redesigning large systems and need better technical control.
- Transitioning from software engineering to systems engineering.
- Improving your systems engineering skill set.

The course is aimed at

- Product engineers
- Systems engineers
- Design engineers
- Acquisition and contracts personnel
- Program/project managers
- Test and logistic support leaders
- Others who participate in defining/using requirements in system/product development

Topics Covered in the Course

Requirements Overview – What are requirements and how do they fit in to system development? Context of system development models. Role of requirements. Importance of requirements. Requirements cycles for contracted, R&D, and commercial development

Stakeholder Requirements – Defining the system at its highest level, in terms of the stakeholder needs. The basic steps in understanding a new system.

- Problem definition with the stakeholders
- System boundaries and life cycle
- System environment
- Define the need in operational terms.
- What to do with the operational descriptions.
- Quantify the need to allow effective trade offs.
- Application of SysML diagrams for operational definition.

Defining Requirements – How to convert operational descriptions into technical requirements.

- Five types of requirements and the characteristics of each type
- Create functional and performance requirements using mission analysis as an engineering technique.
- Interface requirements as a definition of system boundaries; how to create them
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- Constraint requirements on the system, its environment, and its development.
- Verification requirements as the basis for system proof.
- Requirements document types – specifications, use cases, agile, SCRUM
- Formal equirements writing rules

Requirements Analysis – Methods to ensure that systems requirements are complete, coherent, and cohesive.

- Working with requirements interactions
- Diagramming techniques to evaluate sets of requirements
- Useful SysML diagrams: use case, activity, state machine diagrams. Strengths and weakness of each diagram.

Requirements Allocation – Requirements as engineering tools during the system architecting and design phases.

- Overview of system architecture and how requirements are used to define components
- Allocation methods with examples – direct allocation, apportionment, derivation.
- Application of allocation methods to different types of high-level requirements
- Architectural design using requirements

Requirements Management – Using a requirements database to allow requirements to guide the design

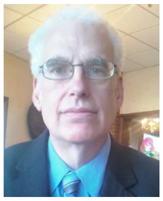
- Requirements management methods; when to do what tasks.
- Feedback to the system development so that requirements act as the guide.
- Ensuring the system meets all requirements and does not add unnecessary functions
- The link between requirements management and system verification
- Attributes of requirements management databases
- Survey of requirements management tools
- Simple management in Excel

Case Study – Small-group study of a virtual development project in five segments to apply the learned methods. Defining the need; Converting stakeholder requirements to technical requirements; Writing good requirements; Requirements analysis; Requirements allocation.

Instructors. (Your course may be taught by any one of the following)

Dr. Eric Honour, **CSEP**, INCOSE Fellow, and former INCOSE President (1997), has been in international leadership of the engineering of systems for 20 years, part of a 45+ year career of complex systems development and operation. His energetic and informative presentation style actively involves class participants. He was the founding Chair of the INCOSE Technical Board in 1994, and served as Director of the Systems Engineering Center of Excellence (SECOE). He was selected in 2000 for Who's Who in Science and Technology and in 2004 as an INCOSE Founder. He is on the editorial board for *Systems Engineering*. He has been a successful entrepreneur, systems engineer, engineering manager, and program manager at Harris Information Systems, E-Systems Melpar, and Singer Link, preceded by nine years as a US Naval Officer flying P-3 aircraft.

Dr. Scott Workinger has led innovative technology development efforts in complex, risk-laden environments for 30 years in the fields of manufacturing (automotive, glass, optical fiber), engineering and construction (nuclear, pulp & paper), and information technology (expert systems, operations analysis, CAD, collaboration technology). He currently teaches courses on program management and engineering and consults on strategic management and technology issues. Scott has a B.S in Engineering Physics from Lehigh University, an M.S. in Systems Engineering from the University of Arizona, and a Ph.D. in Civil and Environment Engineering from Stanford University.



Mr. William "Bill" Fournier (CSEP) is a Senior Software Systems Engineer with 30 years experience, the last 11 for a major defense contractor. Mr. Fournier taught DoD Systems Engineering full time for over three years at DSMC/DAU as a Professor of Engineering Management. He has taught Systems Engineering at least part time for more than the last 20 years. Mr. Fournier holds a MBA and BS Industrial Engineering / Operations Research and is DOORS trained. He is a certified CSEP, CSEP-ACQ, and PMP. He is a contributor to DAU/DSMC, defense contractor internal Systems Engineering courses and process, and INCOSE publications.

Mr. Glen Francisco (CSEP, PMP) has over 17 years of experience developing new technologies, service, products, and applications for both private and government uses. He has a personable, engaging teaching style that keeps a class alive with information. He has worked as an engineer, Lead Systems Engineer, Project Engineer and Program Manager for a number of military & commercial companies. His product systems have supported security surveillance, paramilitary (fire, police & EMS), automotive and industrial markets using passive thermal imaging technologies and other wavelength illuminated electo-optical imaging laser radar technologies.

Mr. John Pratchios has over 40 years experience as a systems engineer designing, implementing and supporting complex hardware/software systems development. His work has included design and implementation of military command, communications, surveillance, and information systems, and also systems for weather imagery, publications control, and locomotive/train control. He is an engaging instructor with a warm, informal, knowledgeable presentation style. He is a specialist in architectural development of both centralized and distributed systems including DODAF and other types of analysis and model development for entire system performance/throughput estimation and validation.