enquiries@scarecrowconsultants.co.uk
+44 (0)7725 848776
+44 (0)7955 460270

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Adventures in Systems Engineering

A three-day course in Systems Engineering activities across a full life cycle, covering: Introduction to Systems Engineering; Stakeholder Engagement; Context Diagrams; Life Cycle Concepts; Requirements Definition; Interfaces; Breakdown Structures; Concept Design; Trade-Offs and Design Decisions; Detailed Design; Assembly and Integration; Testing; Verification and Validation; the V model. This course is based on the book 'Adventures in Systems Engineering', published by INCOSE UK, and the content is taught through interactive, fantasy themed storytelling. Participants work in teams to define, design and deliver an imaginary rescue system over a simulated full life cycle, all the while journeying across an enchanted valley. Throughout the course, teams encounter engaging characters and scenarios that prompt them to perform Systems Engineering activities.

Duration: 3 days

Part One: Definition

Module	Key Learning Points
Module 1: The Adventure Begins	• Introduce the course style, format and trainer. • What are the learning objectives. • How to understand the course material.
Module 2: Introduction to Systems Engineering	• Why do complex engineering projects need Systems Engineering. • What are the definitions of a system and Systems Engineering. • What are some Systems Engineering activities, who does them and when.
Module 3: Stakeholder Engagement	• Why stakeholder engagement is important. • How to engage with stakeholders effectively. • What information can you reasonably expect to receive from an average stakeholder.
Module 4: Context Diagrams	• What is a context diagram and what is it used for. • How to draw a context diagram. • What factors may be taken into account when defining system boundaries.

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Module	Key Learning Points
Module 5: Life Cycle Concepts	• Why it is important to consider the life cycle concept of a system from the outset. • What does a basic, solution agnostic life cycle concept look like. • How much time and effort goes into producing industry level life cycle concepts.
Module 6: Requirements Definition	• What are requirements and why are they necessary. • How to write basic requirements. • What are the characteristics of good requirements. • What basic, additional information needs to be provided alongside requirement statements.
Module 7: Interfaces	• What are interfaces and some different types of interfaces. • Why is it necessary to identify and manage interfaces throughout a project. • Understand that accommodations for interfaces need to be considered from the early stages of development to allow successful interactions with interfacing systems.

Part Two: Design

Module	Key Learning Points
Module 8: Breakdown Structures	• What is a breakdown structure. • Why is it necessary to consider a system in this way. • How to consider different kinds of breakdowns (system and functional).
Module 9: Concept Design	• How Systems Engineering activities in the definition phase provide strong foundations for concept design work. • Understand that initial concept design can often help refine or add new knowledge to definition phase activities e.g., requirements definition.
Module 10: Trade-Offs and Design Decisions	• What is a trade-off in terms of making engineering design decisions. • What different factors are considered when making trade-offs and design decisions. • Understand what role systems engineers play in trade-offs and design decisions.

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Module	Key Learning Points
Module 11: Detailed Design	• Understand how systems engineers and designers work together and how a big picture view is beneficial to both during design activities. • How Systems Engineering artefacts can be used to help with detailed design. • How verification of a system starts early on by reviewing the design.

Part Three: Testing and Beyond

Module	Key Learning Points
Module 12: Assembly and Integration	• What are the core definitions for activities in the build and integration phases of the life cycle. • Understand the difference between assembly and integration.
Module 13: Testing	• Why testing is conducted on a system. • How systems engineers are involved in testing activities. • Understand how a 'big picture' view is useful for testing related activities.
Module 14: Verification and Validation	• What is verification. • What are the different methods of verifying a system. • What is validation.
Module 15: Finale	• Consolidate the learning from the entire course. • What is the V model.
Module 16: Reflection	• What will participants take away from this course and into their day-to-day work. • How can Systems Engineering be of benefit in the projects that participants work on.

Target Audience

The course is intended for participants who:

- Work or aspire to work on complex technical projects, whether as engineers, designers, project managers, scientists, researchers, those in the procurement or sales team, analysts… etc. - anyone at all who works or will work on integrated projects and needs an appreciation of Systems Engineering.
- Need to learn Systems Engineering techniques that they can take back to their desk and start using right away.

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- Are early career professionals, or university students, who will particularly appreciate the fantasy theme as a break from traditional engineering education methods (or indeed later career professionals without prior Systems Engineering knowledge who would also appreciate an engaging fantasy context).

Benefits

By the end of this course, participants will be able to answer the following questions:

- What is Systems Engineering?
- What are the benefits of Systems Engineering and why is it needed for complex projects?
- How does Systems Engineering fit into a project life cycle?
- What Systems Engineering techniques exist and how do I use them?
- How can I apply basic Systems Engineering principles in my day-to-day work?
- Where do I go for further information?

Each of the Modules is also linked to a relevant competency area in the INCOSE Systems Engineering Competency Framework [INCOSE TP-2018-002-01.0]. This course contributes to building these selected competencies to between 'awareness' and 'supervised practioner' level - depending on the competency's chosen indicators of knowledge and the depth of the matching Module.

Prerequisites

None.

Material

Delegates receive PDF copies of the course slides and a physical copy each of the '*Adventures in Systems Engineering Workbook*' written by the course tutor and published by INCOSE UK.

More Information

For more information on this course, or any of our other offerings, please contact Scarecrow Consultants Limited using the details above.