

Systems Engineering Essentials

Foundation Systems Engineering Programme

Course Strapline

Build a practical end-to-end understanding of systems engineering, from stakeholder needs and requirements to architecture, integration, verification, validation and lifecycle realisation.

Course at a Glance

Course Duration	Five days / 25 instructional hours On-demand equivalent	Delivery Modes	Classroom Live Virtual On-Demand Blended In-company
Level	Foundation	Digital Materials	Integrated systems case, engineering workshops, decision exercises and practical systems-engineering tools
Certificate	INDENTRA course-completion record, where applicable	Professional Recognition	PMI Talent Triangle® - 25 PDUs

PMI Talent Triangle® and Professional Development Units (PDUs)

Total PDUs: 25	Ways of Working: 18	Power Skills: 3	Business Acumen: 4
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Course Overview

Systems Engineering Essentials provides a practical foundation for understanding how complex systems are defined, developed, integrated, verified and managed across their lifecycle. The course connects systems thinking, stakeholder needs, requirements, architecture, interfaces, trade studies, technical management, integration, verification, validation and lifecycle realisation. Across five modules, participants work with an integrated multidisciplinary case and create practical engineering outputs that support traceability, technical decisions, assurance and workplace application.

Learning Outcomes

By the end of this course, you will be able to:

- Explain the systems engineering lifecycle and frame a system in its operational, stakeholder and organisational context.
- Elicit stakeholder needs and translate them into clear, traceable system requirements, quality attributes, constraints and interfaces.
- Develop functional and physical architecture views, manage critical interfaces and evaluate alternatives through trade studies and system analysis.
- Plan technical management, risk, configuration, integration, verification, validation and acceptance evidence.
- Apply whole-lifecycle thinking to realisation, transition, operation, sustainment, retirement and learning.

Benefits

Benefits to the Individual • Build an integrated foundation across the systems engineering lifecycle. • Strengthen requirements, architecture, interface and trade-study judgement. • Create practical engineering artefacts and connect them through traceability. • Prepare for more advanced systems engineering, MBSE, integration or certification-focused learning.	Benefits to the Organisation • Improve consistency in system definition, technical decisions and lifecycle thinking. • Strengthen multidisciplinary communication across engineering, project and assurance roles. • Improve traceability from stakeholder need through architecture, V&V and lifecycle evidence. • Create a stronger foundation for technical governance, reviews and reusable engineering practice.
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Who Should Attend?

Designed for engineers and technical specialists moving into systems roles; project, programme and technical managers working with complex engineered systems; business analysts and requirements professionals; quality, assurance, integration and test professionals; and practitioners preparing for more advanced systems engineering or certification programmes.

Prerequisites and Equipment

No formal systems engineering qualification is required. Technical or project experience is helpful, and participants should be prepared to work through an integrated multidisciplinary case. A laptop or tablet may support digital materials, modelling views and case work.

Learning Approach

The programme combines core systems engineering concepts with an integrated lifecycle case, engineering workshops, technical reviews and structured decision exercises. Participants connect system context, stakeholder needs, requirements, architecture, trade studies, technical management, integration, verification, validation and lifecycle application. On-demand learning follows the same sequence through structured digital content, guided case work, examples, knowledge checks and practical outputs.

Digital Learning Materials

Digital participant resources support classroom, virtual, blended and on-demand learning and may include:

- Digital workbook covering systems thinking, lifecycle context, stakeholder needs, requirements, architecture, technical management, integration and V&V.
- Templates for system context, stakeholder mapping, requirements, traceability, architecture, interface analysis, trade studies and V&V evidence.
- Integrated systems case, engineering scenarios, technical-review exercises and worked examples.
- Knowledge checks and job aids covering lifecycle logic, requirements quality, interfaces, decision evidence, configuration and assurance.
- Reusable systems engineering artefacts and workplace-transfer plan.

Assessment, Certification and Professional Recognition

Completion requires participation in applied exercises or equivalent on-demand activities; the integrated systems case; the core system-definition, architecture, trade-study and V&V outputs; and a final lifecycle assurance review or structured self-paced equivalent. An INDENTRA completion record may be provided where applicable. No third-party certification is claimed unless explicitly confirmed. Eligible PMI credential holders may claim 25 Education PDUs: 18 Ways of Working, 3 Power Skills and 4 Business Acumen.

Course Outline

The course comprises five integrated modules and 25 instructional hours, typically over five days. The on-demand equivalent preserves the same outcomes, guided case work, knowledge checks and practical engineering outputs in a structured self-paced format.

Module 1 - Systems Engineering Context, Life Cycles and Systems Thinking

Frame the system, its purpose, context and lifecycle before making detailed engineering decisions.

- Systems, complexity and interdisciplinary engineering.
- Stakeholders, mission, context and lifecycle perspectives.
- Lifecycle models, processes and tailoring.
- Roles, governance, technical reviews and decision rights.

Applied Activity - System Context and Lifecycle Framing Workshop

Participants define the system of interest, mission and context, identify key stakeholders and lifecycle stages, and establish the principal governance and technical-review points for the integrated case.

Module 2 - Stakeholder Needs, Requirements and Traceability

Translate stakeholder intent into a disciplined and traceable basis for system definition.

- Stakeholder identification and needs elicitation.
- Need statements, system requirements and quality attributes.
- Requirement quality, interfaces, constraints and assumptions.
- Traceability, validation and change awareness.

Applied Activity - Needs-to-Requirements and Traceability Lab

Participants develop a stakeholder map, convert selected needs into well-formed system requirements and create an initial traceability view linking needs, requirements, interfaces and validation intent.

Module 3 - Architecture, Functional Analysis and Trade Decisions

Develop connected architecture views and use explicit criteria to compare system alternatives.

- Functional analysis and logical architecture.
- Physical architecture, allocation and interfaces.
- Architecture viewpoints and decision evidence.
- Trade studies, criteria and system analysis.

Applied Activity - Architecture and Trade-Study Workshop

Participants develop functional and physical architecture views, identify critical interfaces and compare alternative design choices through a structured trade-study decision matrix.

Module 4 - Technical Management, Integration and V&V

Plan the management, integration and assurance disciplines required to realise the system coherently.

- Systems engineering management planning.
- Risk, configuration, information and decision management.
- Integration strategy and verification planning.
- Validation, acceptance and evidence management.

Applied Activity - Technical Management and V&V Planning Review

Participants outline the systems engineering management approach, establish selected technical controls, sequence integration and build a verification/validation evidence matrix linked to requirements and intended use.

Module 5 - Lifecycle Realisation, Transition and Application

Connect system definition to implementation, transition, operation, sustainment, retirement and learning.

- Implementation and system realisation considerations.
- Transition, operation, maintenance and sustainment.
- Retirement, lessons and lifecycle feedback.
- Integrated case review and workplace application.

Applied Activity - Lifecycle Realisation and Assurance Review

Participants review the complete case from stakeholder intent through requirements, architecture and V&V, then identify transition, sustainment and retirement considerations and prepare a practical workplace-transfer plan.

Tools, Frameworks and Practical Outputs

Participants progressively build and use a practical set of systems engineering artefacts through the integrated multidisciplinary case:

- System context, stakeholder and lifecycle framing views plus a traceable stakeholder-needs and requirements set.
- Functional and physical architecture views, critical-interface analysis and trade-study decision matrix.
- Systems engineering management outline, technical-review map and integration / V&V evidence matrix.
- Lifecycle transition, sustainment and workplace-transfer action plan.

Delivery Modes Available

Live Classroom | Live Virtual Classroom | On-Demand Learning | Blended Learning | Corporate / In-company. Classroom delivery uses facilitated discussion, an integrated systems case, engineering workshops, technical reviews and immediate feedback. Live virtual delivery uses collaborative workspaces, breakout activities, coached practice and guided application. On-demand learning provides a structured self-paced route using the same core outcomes, digital resources, guided case exercises, worked examples, knowledge checks and practical outputs. Blended learning combines preparation, live sessions, applied assignments, workplace tools and follow-up. Corporate delivery may incorporate organisational lifecycle processes, technical standards, engineering roles, models and anonymised systems cases where appropriate.

Course Enquiries

Visit www.indentra.co.uk/systems-engineering-essentials for the latest course information, delivery availability and enquiry options.