

Class 1: Understanding the INCOSE Certification Process

Tutorial on the INCOSE SE Handbook V4.0 in Preparation for SEP Certification Exam

Understanding the INCOSE Certification Process

From INCOSE Systems Engineering Handbook v. 4.0

SYSTEMS ENGINEERING HANDBOOK

FOURTH EDITION

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Webinar Agenda

- Why Systems Engineering?
- What is INCOSE?
- What is the INCOSE SEP Certification?
- Review the INCOSE SEP Certification Application Process
- Review the Key Requirements of Certification
 - Education Application
 - Experience _
 - -Knowledge Exam

From INCOSE Systems Engineering Handbook v. 4.0



Your Instructor



Paul Martin, ESEP

- Working as an Engineer since late '70's
- GE \rightarrow NAVSEA \rightarrow NIMA \rightarrow Army \rightarrow DoD
- UMBC Adjunct Professor
- Involved with local INCOSE Chapter (Chesapeake)
 - I've been teaching the INCOSE SEP Exam Prep Course since 2009

- But enough about me, what about you?
 - Using the Chat function. Tell us:
 - Where do you live
 - Are you going after the ASEP/CSEP or ESEP?
 - Are you new to INCOSE?



The INCOSE Certification Process

Understanding the INCOSE Certification Process



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The need for Systems Engineers



"Another factor contributing to program failure is the shortage of technically trained people, especially systems engineers. A systems engineer translates technical needs into an overall system architecture that creates the best operational capability at the most affordable cost. As a project proceeds and goals or needs shift, systems engineers have to determine the difficult but necessary cost, schedule, and performance trade-offs to keep everything on track. As programs get bigger and more complex, the need for rigorous systems engineering increases."

IEEE Spectrum, Volume 45, Issue 11, November 2008 Page(s):33 - 39

CNNMoney.com

- Date: Oct 2009
- Systems Engineer ranked as #1 job in America
- Mentions INCOSE CSEP as a potential pre-requisite

WMoney.com BEST JOBS IN AMERICA Money/PayScale.com's list of great careers 2009 ~ Technology Job Growth High Pay Full List 1. Systems Engineer Sector: Information Technology TOP 50 rank: 1 What they do: They're the "big think" managers on large, complex projects, from major transportation networks to military defense programs. They figure out the technical specifications required and coordinate the efforts of lower-level engineers working on specific aspects Anne O'Nell, a chief systems engineer at the NYC. nnine orwen, a chief systems engineer arme N.Y.C. Transit Authority, is one of five female senior manage Why it's great. Demand is soaring for of the project. systems engineers, as what was once a department of 1,500 niche job in the aerospace and defense industries becomes commonplace among a diverse and expanding universe of employers, from medical Pay can easily hit six figures for top performers, and there's amount of the reader of device makers to corporations like But many systems engineers say they most enjoy the creat but many systems engineers say they most enjoy the t projects come to life. The transit system I work on rea Xerox and BMW. says Anne O'Nell, chief systems engineer for the 11 ong hours are comm

Symbol

[Keyword

Lunury

Small Bus

SEs are Problem-solvers

Across an organization's products or services, systems engineers also provide critical leadership for integrating the technical activities. They have skills to influence multidisciplinary teams to reach consensus on how the system solution should come together. As problem-solvers, they focus on outcome, not process. ~ John Thomas, INCOSE President

Why Systems Engineers are Essential to Your Organization



What is INCOSE?

- The International Council on Systems Engineering (INCOSE) is a not-for-profit membership organization founded in 1990 to develop and disseminate the interdisciplinary principles and practices that enable the realization of successful systems.
- **MISSION:** Share, promote and advance the best of systems engineering from across the globe for the benefit of humanity and the planet.
- VISION: The world's authority on Systems Engineering.

INCOSE Products

- Annual INCOSE International Symposium
- Journal of Systems Engineering
- INSIGHT Magazine
- Systems Engineering Body of Knowledge (SEBoK)
- OMG Systems Modeling Language (OMG SysML[™])
- INCOSE Systems Engineering Handbook





Guide to the Systems Engineering Body of Knowledge

INCOSE Certification Program



INCOSE has established a multi-level Professional SEP Certification Program to provide a formal method for recognizing the knowledge and experience of systems engineers, regardless of where they may be in their career.

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The INCOSE certification program has been developed as the highest quality, independent assessment of system engineering professionals.

Purpose and Design (benefits)

- Systems engineering community:
 - Creates the standard to identify and develop systems engineering professionals .
 - Establishes a formal, recognized body of knowledge for the systems engineering community.

• System engineering professionals:

- Provides a portable standard of recognition for attainment of knowledge, education, and experience.
- Its recertification requirements serve as a mechanism for continued professional development.

Organizations/institutions:

 A universal, industry-approved measure of a professional's knowledge – achieved through the independent evaluation of relevant tasks, projects, and programs.

Certifications have been offered by INCOSE since 2004

Understanding the INCOSE Certification Process



What Is Certification?

- It's NOT a Certificate: a document attesting to the fact that a person has completed an educational course
- It's NOT a License: formal permission by the State to carry on some business or profession.
- Certification is:
 - Confirmation of an individual's competency (demonstrated education, experience, and knowledge) in a specified profession or occupational specialty
 - A formal process Issued by an organization
 - Voluntary
 - It is neither a barrier nor a gate to entering a job
 - However, it may be used as a qualifier in placement

Professional Societies and Certifications



(ISC)²°



- PMP Project Management Professional
- PgMP Program Management Professional
- CAPM Certified Associate in Project Management
- ACP Agile Certified Practitioner
- International Information Systems Security Certification Consortium
 - CISSP Certified Information Systems Security Professional
 - IEEE Computer Society
 - CSDP Certified Software Development Professional

IEEE (computer society

INCOSE Multi-Level Certification



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Why is Certification Important?



For organizations...

- Formally recognizes the Systems Engineering capabilities of an organization's professional staff
- Can be a discriminator a discriminator for an organization's proposals
- Can be used as part of the hiring and promotion process
- Provides an <u>independent</u> internal and external assessment
- Encourages employee participation in continuing education

INCOSE Certification sets an organization apart!



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Successful Systems Engineering

Organizational Systems Engineering Processes ISO & CMMI Certify SE Processes

Experienced, Knowledgeable Systems Engineers INCOSE SEP Certifies SE Experience, Knowledge and Education

INCOSE Certification focuses on the company's people. It complements an organizational initiatives.

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Certification Change in Focus

erom organization to people

Organization ABC... ISO 9000 ISO 15504 CMMI etc.

Individual First_Last ... ASEP, CSEP, ESEP CSDP CAPM, PMP, PgMP CSSIP etc.

Certification focuses on the company's people. It complements an organizational initiatives.

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Why is Certification Important?



For individuals...

- Formally recognizes your Systems Engineering capabilities
- Provides a discriminator for job applicants
- Provides a competitive advantage in your career
- Provides a <u>portable</u> Systems Engineering designation that is recognized across industry domains.
- Participation in continuing education indicates your commitment to personal development

INCOSE Certification sets you apart!

Why is Certification Important?



For your teams...

- Allows the team to level-set on Systems Engineering concepts and activities
- Helps establish a common Systems Engineering language for your team
- This can help break down ...
 - geographic boundaries
 - organizational boundaries
 - cultural boundaries

INCOSE Certification is particularly useful for multiorganization, geographically distributed teams.

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Ways to Leverage Certification



- Individuals
 - Recognition
 - Designation on business card, resume, signature, etc
 - Performance objective
- Organizations
 - Performance expectation
 - Career ladder alignment
 - Job advertisement
 - Proposal discriminator
 - Supplier qualification



The INCOSE certification program has experienced impressive growth and increased recognition since its introduction in 2004

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Certification Agreements



- EADS
- Booz Allen Hamilton
- ManTech
- MITRE
- Lockheed Martin
- TASC
- BAE Systems
- Jacobs Technology
- ASTER Technology &
 Engineering
- LinQuest
- Thales

- OPS Consulting
- L-3 Communications
- The SI Organization
- Stevens Institute of Technology
- University of Texas El Paso
- École Polytechnique
 - ISAE/Supaero
 - University of New South Wales
- Worcester
 Polytechnic Institute

The SEP Aligns with the Typical Levels of a Systems Engineering Career



You can enter at whatever SEP level is appropriate and can seamlessly transition between levels when ready.

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Entry Level

Associate Systems Engineering Professional

- Targeted towards junior/maturing Systems Engineers and recent college graduates with limited Systems Engineering work experience
- ASEPs are certified against knowledge requirements through an exam based on the INCOSE SE Handbook
- ASEPs must be, and remain, INCOSE members
- Renewal every 5 years through ongoning professional development, maximum duration of 15 years
- Available since 2008



Applicant has <u>up to one year</u> to pass the test. <u>Test is</u> <u>scheduled directly</u> with Prometric.

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Foundation Level

Certified Systems Engineering Professional

- Targeted towards Systems Engineers with five or more years of Systems Engineering work experience
- CSEPs are certified against substantiated experience, education, and knowledge requirements
- Experience must be substantiated by 3-5 work-related references
- Knowledge certified through an exam based on the INCOSE SE Handbook
- INCOSE membership has been required since 2016
- Renewal every 3 years through ongoing professional development
- Available since 2004

Review First Option CSEP Certification Process



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Exam First Option CSEP Certification Process



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Senior Level

Expert Systems Engineering Professional

- Targeted towards senior Systems Engineering leaders with recognized systems accomplishments, who have many years of Systems Engineering work experience
- ESEPs are certified against substantiated professional leadership, systems engineering accomplishments, experience, and education requirements
- At least 10 years of experience must be substantiated by 3-5 workrelated references
- Interviews used to validate leadership and significant systems accomplishments
- ESEPs must be, and remain, INCOSE members
- No renewal requirements other than INCOSE membership
- Available since 2010

ESEP Certification Process



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Key Requirements of Certification



These elements of the INCOSE certifications are measurable tangible parameters consistent with ISO guidelines for a certification program.

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Certification Education Requirements



These elements of the INCOSE certifications are measurable tangible parameters consistent with ISO guidelines for a certification program.

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Certification Education Requirements

- Technical Bachelor's Degree (or international equivalent)
 - Acceptable engineering fields of study include: aeronautics, biomedical, chemical, civil, computer, electrical, environmental, mechanical, nuclear, software, systems
 - Acceptable other fields of study include: chemistry, computer science, mathematics, physics
 - If the Bachelor's degree does not come from the above fields, then a Masters or Doctorate degree (or international equivalent) in those fields is acceptable
 - INCOSE is the final authority on degree applicability

Additional Experience Can be Substituted

- Minimum of 5 additional years of general engineering experience for non-technical Bachelor's degree
 - Minimum of 10 years (with at least 5 in SE) for CSEP
 - Minimum of 25 years (with at least 20 in SE) for ESEP w/ CSEP
 - Minimum of 30 years (with at least 25 in SE) for ESEP w/o CSEP
- Minimum of 10 additional years of general engineering experience if no Bachelor's degree
 - Minimum of 15 years (with at least 5 in SE) for CSEP
 - Minimum of 30 years (with at least 20 in SE) for ESEP w/ CSEP
 - Minimum of 35 years (with at least 25 in SE) for ESEP w/o CSEP

Certification Experience Requirements



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14 Functional Areas Recognized for Systems Engineering Experience

- SE Technical Competencies
 - Requirements Engineering
 - Design Development
 - System Integration
 - Qualification, Verification, and Validation
- SE Management Competencies
 - Technical Planning
 - Technical Effort Assessment
 - Risk and Opportunity Management
 - Baseline Control

- SE Support Competencies
 - Specialty Engineering
 - Process Definition
 - Training
 - Tool Support
 - Quality Assurance
 - Plus "Other"
 - To allow for the variety of SE across domains
 - Applicants should describe what they are claiming as other experience

Successful candidates must have balanced experience across multiple areas

Understanding the INCOSE Certification Process


SE Disciplines/Functional Areas Qualifying for SE Experience (1 of 2)

Attachment A - Experience Applicable for Certification

Systems engineering functions include but are not limited to the following:

- <u>Requirements Engineering</u>: analyze customer and stakeholder needs, generate/develop requirements, perform functional analyses, derive requirements, ensure requirements quality, allocate requirements, control requirements, maintain requirements database, develop and implement Requirements Management Plans, develop measures of effectiveness and performance
- <u>**Risk and Opportunity Management**</u>: develop and implement Risk and Opportunity Management Plans, identify risk issues and opportunities, assess risk issues and opportunities, prioritize risks and opportunities, develop and implement risk mitigation and opportunity achievement plans, track risk reduction and opportunity achievement activities
- **Baseline Control**: develop and implement Configuration Management Plans, establish and update baselines for requirements and evolving configurations/products, establish and implement change control processes, maintain traceability of configurations, participate in Configuration Control Boards, participate in configuration item identification and status accounting, participate in functional and physical configuration audits
- **Technical Planning**: identify program objectives and technical development strategy; prepare Systems Engineering Management Plans, program Work Breakdown Structures, product Breakdown Structures, Integrated Master Plans, and Integrated Master Schedules; identify program metrics including product technical performance measures and key performance parameters, identify program resource needs in terms of equipment, facilities, and personnel capabilities
- **Technical Effort Assessment**: collect, analyze, track, and report program metrics including product technical performance measures and key performance parameters; conduct audits and reviews; assess process and tool usage compliance; conduct capability assessments; recommend and implement process and product improvements



SE Disciplines/Functional Areas Qualifying for SE Experience (2 of 2)

Attachment A - Experience Applicable for Certification

- Architecture/Design Development: identify baseline and alternate candidate concepts and architectures, prepare Trade Study Plans, conduct and document trade studies, evaluate and optimize candidate concepts and architectures, prepare system/solution description documents
- Qualification, Verification, and Validation: develop and implement Qualification, Verification, and Validation Plans; develop verification requirements and pass/fail criteria; conduct and record results of qualification, verification, and validation efforts, and corrective actions; prepare requirements verification matrix and qualification certificates
- **Process Definition**: define enterprise processes and best practices, tailor enterprise processes for program/project applications
- **Tool Support**: specify requirements for, evaluate, select, acquire, and install SE computer programs/tools
- **Training**: develop and implement Training Plans, develop and give training courses on processes and tools
- **Systems Integration**: define technical integration strategy, develop Integration Plans, develop integration test scripts, develop and implement integration test scenarios, conduct and document integration tests, track integration test results and retest status
- **Quality Assurance**: develop and implement a Quality Assurance Plan, perform quality audits, report quality audits, define and track quality corrective actions
- **Specialty Engineering**: develop and implement Specialty Plans as part of, or an addendum to, the Systems Engineering Management Plan to cover such specialties as reliability, maintainability, supportability, survivability, logistics support, security, safety, human factors, electromagnetic environmental effects, environmental engineering, packaging and handling, etc.
- **Other**: describe other functions that you have performed and can justify as system engineering activities.



CSEP Certification Experience Requirements

- Systems Engineering Experience
 - Minimum 5 years of professional level experience in multiple SE functional areas (and any additional general years of experience necessary due to education status)
 - Minimum of at least 1 year of professional level SE experience in each of 3 or more of the 14 SE functional areas
 - Must be documented on the INCOSE application form
- Experience Confirmation
 - Recommendations from at least 3 colleagues / peers / managers
 - References must cover at least 5 years and 3 areas of SE experience claimed by the applicant (including any additional years)
 - References must be knowledgeable in Systems Engineering (or general engineering for any additional years)
 - Must be documented on the INCOSE reference form

CSEPs should have experience in performing some, but not necessarily all, of the SE functional areas

INCOSE Systems Engineering Professional (SEP) Exam Preparation Course



Distribution of Systems Engineering Experience for CSEP

The CSEP candidate must have at least <u>1 year of SE experience in</u> each of <u>3 or more of the 14 systems engineering functional areas</u>

					I I	
	Option 1	A1	A2		A3	
CSEPs should	Option 2	A1	A2	A3	A	4
have					1 1 1	
experience in	Option 3	A1	A2	A3	A4	A5
performing					 	
all SF areas	Option 4	A1	A2	A3	A4	A5 A6
	Option X	A1	A2	A3	Applicant	's Choice
		1	2	3	4	5 Years
	Some Options for Distributing Five Years of SE Experience in Various SE Functional Areas (A1, A2, etc.)					

Understanding the INCOSE Certification Process



The Application

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All of the Application Material is Available On-line

verunoauon

- ---- Why Get Certified?
- Which Is Right For Me?
- The Certification Process
- Discounts & Agreements
- --- Certification Program History
- --- Certification Resources
- Certification Forms
- Certification Forms
- Ceruncation FAQs

Certification Forms

Home / Certification / Certification Forms



Note: these forms represent the funcial application and renewal requirements for the INCOSE Systems Engineering Professional certification program as of their publication dates. If there are any conflicts between any other public certification information 1.5., the INCOSE certification website) and these forms, the content of these forms takes precedence. The INCOSE Concation Program Office is the final authority in the interpretation of the requirements on these forms.

- Initial Application for INCOSE ASEP or CSEP Certification
- Initial Application for INCOSE ESEP Certification
- Group Related Forms
- <u>Appeals</u>
- <u>Renewal of INCOSE Systems Engineering Certification</u>
- Special Accommodations Requests
- <u>Click Here to Download Certification Payment Form</u>

Initial Application for INCOSE ASEP or CSEP Certification

Size	Date	Download
1.32 MB	16 Dec, 2015	Download
694.00 KB	10 Oct, 2014	Download
73.19 KB	08 Oct, 2015	Download
148.35 KB	10 Oct, 2014	Download
518.00 KB	10 Oct, 2014	Download
	1.32 MB 694.00 KB 73.19 KB 148.35 KB 518.00 KB	Size Date 1.32 MB 16 Dec, 2015 694.00 KB 10 Oct, 2014 73.19 KB 08 Oct, 2015 148.35 KB 10 Oct, 2014 518.00 KB 10 Oct, 2014

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Download the forms from INCOSE website

Instructions for Filling out ESEP Certification Application Form 42

PDF 79.66 KB

08 Oct, 2015 PDF Download

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a Ad ber 8 or P a Pe aby: [Add Nun mess of Pr ss of ber 8 tor P m Po abry:	are To a cl a cl is sub is sub for Dr Ref Dr Ref Dr Ref I wow I a www. I a www. I a www. I a www. I a www. I be www. I be suc or 1 Th mua eng Eax Eax Eax Eax Pr Th hav Pr the for I I I I I I I I I I I I I I I I I I I	Red Ad Cire Reference for CSEP bje See Form 4A "CSEP Instructions to References" for guidance on filling out this form and recommendations on CSEP certification of the applicant. a agenta mail agua Applicant's Information Given Name / First Name Family Name / Surname E-mail Address Country ease now	m with your comments
	and a second	Reference's Information Given Name / First Name Family Name / Sumame	

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Suggestions

- E-Mail prospective references At least 5
 - Must be Systems Engineers!
 - Confirm their interest
 - Confirm their Information for application

Reference 1 Name:

Address: Number and Street: City: State or Province: Zip or Postal Code: Country: Phone Number: Email Address: Work Relationship of Reference to Applicant: Applicant Position(s) (P1-P7) to be Covered by this Reference:

E-mails

Dear so and so,

I'm applying for certification as a Systems Engineering Professional with the International Council on Systems Engineering (INCOSE). Part of the certification process requires three references who can attest to my systems engineering acumen. So I thought of you and how you can explain my work in [place here Systems engineering function(s) i.e. Requirements Engineering] for [place here the activity you did i.e. the SpaceAge contract where I analyzed the customer comments against the system spec and went through the CM process in order to incorporate the changes.]

They need a two week turn around so **before** I submit my application and start the clock I wanted to make sure my references where agreeable and available to help me out. So let me know if you can. No pressure if you're uncomfortable with the request or, more likely, too busy. Just let me know so I can keep looking around. Attached are the instructions and form so you'll know what you'll be asked to do.

Thanks for the consideration. Just let me know if you can or can't. If you can, I need the "reference's information" (mailing address, title, etc) so I can fill out the application. Don't fill out the forms until I send them to you again.

Let me know,

Understanding the INCOSE Certification Process

Experience to Matrix

- Read and understand the 14 SE Work Areas or Functions or Roles outlined in *Attachment A - Experience Applicable for Certification* in the INCOSE Application Instructions.
 - Even if you feel you were not doing Systems Engineering at the time, it may still count if it falls into one of these 14 SE Work Areas.
- Take each of your Work Experiences and break them up into these SE Functions.
 - Use the language provided in the descriptions of the SE Functions in Attachment A when describing your experience.
- Estimate the amount of time, in months, you spend doing each SE Function.
 - If you find that during your assignments or positions you were doing more than one SE Function, then figure out a percentage of time you spent on each function

Experience to Matrix

P2 Date (Month & Year) From: Jan 2003 Date to: Aug 2006 (43 months) - Notice I calculated the Total Numbers of Months. The bottom cell of P2 in matrix cannot exceed this. Organization Name: WELKIN Associates, Ltd. (Subsidiary of Computer Sciences Corporation) Immediate Supervisor/Peer: Name: Title: Address: E-mail Address: Phone Number: Reference(s) that will cover this position (if none, state so): Your Title/Position: Senior Systems Engineer Your Duties and Responsibilities: (NOTE: The attached box for your inputs will expand to accommodate the information you provide; the size of the empty box is not an indication that limited input is expected.) Assigned as a Senior Systems Engineer on a sub-contract to a Lockheed Martin contract with a DoD Agency. Systems Engineering Experiences included: (1) SE Function: Technical Planning -- Months of Experience: $12 \leftarrow$ This is put into Experience Matrix I prepared a program Integrated Master Schedule by using Primavera, an enterprise level program management tool, to input, status and update. I identified the schedule program metrics, measured and presented them to the customer at the monthly Program Management Review. (2) SE Function: Process Definition -- Months of Experience: 9 \leftarrow This is put into Experience Matrix I developed a Compliance-Verification and Facilitation process to supported the Agency Enterprise Standards Program. The process accessed system developers in their use of standards in relation to the Enterprise infrastructure architecture.

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Experience to Matrix



One More thing

- The application fields don't allow spell checking. So it's best to write your Experience in a separate document that you can spell check.
- However If you already started within the application, you may want to copy and paste the various entries into another different MS Word file to check the spelling.
 - You'll need to paste special as text
 - (if you paste it direct then for some reason it carries the "don't check spelling" option with it. However, you can change it by selecting all your text, go to **Review** tab and then **Language** → Set Proofing Language... and check off the *Do not check spelling or grammar* option)

Certification Knowledge Requirements



These elements of the INCOSE certifications are measurable tangible parameters consistent with ISO guidelines for a certification program.

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Certification Knowledge Requirements

- CSEP/ASEP Exam Basis
 - INCOSE SE Handbook v4
 - Free download available to INCOSE members
- Exam is
 - 2 hours in length
 - 120 questions
 - Administered electronically at world-wide Prometric locations
 - Pass/Fail results provided immediately upon exam completion
- Candidates are eligible for two re-tests within one year of application submittal



The INCOSE Systems Engineering Handbook is the basis for the CSEP & ASEP exams.

PROMETRIC

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SYSTEMS ENGINEERING HANDBOOK

WILEY



- Which three of the following are methods to express functional behavior? (Choose three)
 - A. Network Tree (NT)
 - B. Behavior Diagram (BD)
 - C. Allocated Requirement Diagram (ARD)
 - E. Functional Flow Block Diagram (FFBD)
 - F. Integrated Definition for Functional Modeling (IDEF) Diagram

- Which are three justifications for Configuration Management? (Choose three)
 - □ A. facilitates communication
 - B. forces change evaluations
 - C. prevents requirements changes
 - D. controls requirements changes
 - E. encourages requirements changes

Note: These questions *ARE NOT* from the INCOSE Certification Exam. The format and content are similar (based on SEH v2A). They were created by CSM and Prometric and are used with permission.



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- Sample Questions from INCOSE
 - <u>http://www.incose.org/certification/</u>
 <u>CertResources</u>
- Performed poorly in the 2014 beta exams.
- Representative of the format and content on the actual exam
- Assist in understanding how the INCOSE exam is structured.

Sample Exam Questions 2015



The INCOSE Certification Program Office has committed to release sample test questions to help guide applicants and training providers in understanding the format of the INCOSE knowledge exam. The following questions and answers are not planned to be used by the INCOSE Certification Program because of how they performed when tested on candidates in the 2014 beta exams. They are representative of the format and content on the actual exam and can be used by knowledge exam candidates to assist in understanding how the INCOSE exam is structured.

- 1. How may a system operator use a system to sustain engineering?
- A. by reviewing verification analysis
- B. by reviewing operator procedures
- C. through monitoring system performance data
- D. through monitoring the number of trained operators
- Which two are commonly evaluated as part of the Project Assessment Process? (Choose two.)
- A. the network security policy
- B. the standards applied to the project
- C. the availability of necessary resources
- D. the availability of management to the project
- E. the compliance with project performance measures
- 3. What is an example of the wasteful practice of over-processing?
- A. Members of a team are split between three physical facilities.
- B. The vendor ships four rocket motors to a launch site two years before they are needed.
- C. An engineer takes a released interface document and reformats it to material previously worked.
- D. A valve is selected by an engineer to meet a deadline a requiring a subsystem redesign.
- 4. What are two practices an organization or cific project? (Choose two



Preparing for the Exam

- Study the INCOSE SE Handbook
- Sign-up for my UMBC Training Center's INCOSE SEP Exam Preparation Bootcamp
 - Learn the framework of the 31 Processes within the INCOSE SE Handbook vs 4.0.
 - Have access to dozens of practice Quizzes.
 - Start to appreciate the context of Systems
 Engineering

Getting the Handbook

- A printed copy is available for purchase at \$30 US by members (\$65 US, nonmembers). Check it out on the <u>SE Handbook</u> webpage of the INCOSE website.
- A PDF version of the Handbook is available as a free download from the <u>Product Area of INCOSE</u> <u>Connect to INCOSE Members and</u> to <u>INCOSE Corporate Advisory</u> <u>Board (CAB)</u> employees .



Suggest getting a spiral bound double sided copy made at Office Depot or Staples (~ \$30)



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New Bootcamp starts soon!



PURCHASE THE COURSE TODAY AT

http://www.umbctraining.com/Courses/Engineering-(EG)/systemsengineering-training/BU-2122C-(1)

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Course Battle Rhythm (BootCamp)

- Before class
 - Read assigned sections of the Handbook
 - Take Quizzes
- Class Structure

Morning	Afternoon			
Lecture	75 min	LU	Lecture	75 min
Break	15 min	N	Break	15 min
Lecture	90 min	C H	Lecture	90 min

- After class
 - Take Quizzes

INCOSE Systems Engineering Professional (SEP) Exam Preparation Course



Understanding the INCOSE Certification Process

From INCOSE Systems Engineering Handbook v. 4.0

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SE Handbook V4.0 Contents

1 SE Handbook Scope

2 Systems Engineering Overview

3 Generic Life Cycle Stages

4 Technical Processes

- 4.1 Business or Mission Analysis Process
- 4.2 Stakeholder Needs and Requirements Definition Process
- 4.3 System Requirements Definition Process
- 4.4 Architecture Definition Process
- 4.5 Design Definition Process
- 4.6 System Analysis Process
- 4.7 Implementation Process
- **4.8 Integration Process**
- **4.9 Verification Process**
- **4.10 Transition Process**
- 4.11 Validation Process
- **4.12 Operation Process**
- 4.13 Maintenance Process
- 4.14 Disposal Process

5 Technical Management Processes

- 5.1 Project Planning Process
- 5.2 Project Assessment and Control Process
- 5.3 Decision Management Process
- 5.4 Risk Management Process
- 5.5 Configuration Management Process

- 5.6 Information Management Process
- 5.7 Measurement Process
- 5.8 Quality Assurance Process
- **6** Agreement Processes
- 7 Organizational Project-Enabling Processes
 - 7.1 Life Cycle Model Management Process
 - 7.2 Infrastructure Management Process
 - 7.3 Portfolio Management Process
 - 7.4 Human Resource Management Process
 - 7.5 Quality Management Process
 - 7.6 Knowledge Management Process
- 8 Tailoring process and Application of SE
- 9 Cross-Cutting Systems Engineering Methods
 - 9.1 Modeling and Simulation
 - 9.2 Model-Based Systems Engineering
 - 9.3 Functions-Based Systems Engineering Method
 - 9.4 Object-Oriented Systems Engineering Method
 - 9.5 Prototyping
 - 9.6 Interface Management
 - 9.7 Integrated Product and Process Development
 - 9.8 Lean Systems Engineering
 - 9.9 Agile Systems Engineering

- **10 Specialty Engineering Activities**
 - 10.1 Affordability/Cost-
 - Effectiveness/LCC Analysis
 - 10.2 Electromagnetic Compatibility
 - 10.3 Environmental Engineering Impact Analysis
 - 10.4 Interoperability Analysis
 - 10.5 Logistics Engineering
 - 10.6 Manufacturing and Producibility Analysis
 - 10.7 Mass Properties Engineering
 - 10.8 Reliability, Availability, and Maintainability
 - 10.9 Resilience Engineering
 - 10.10 System Safety Engineering
 - 10.10 System Safety Engineering
 - 10.11 System Security Engineering
 - 10.12 Training Needs Analyses
 - 10.13 Usability Analysis/Human Systems Integration
 - 10.14 Value Engineering
- Appendix A: References
- Appendix B: Acronyms
- Appendix C: Terms and Definitions
- Appendix D: N2 Diagram of Systems Engineering Processes
- Appendix E: Input/Output

Descriptions

Understanding the INCOSE Certification Process

Applicable Lews and Regulations; Standards ORGANIZATIONAL PROJECT INABUNG PROCESSES **Gualty** management guidelines colars and report **ON** corrective action 7.3 Portic Quality assurance plan; Quality assurance report; and Quality assurance evaluation report Manao PM] Proces ment [RM] Process Project Direction & Project Portfolio nance Measures Needs & Data 5.2 Project Assessment and Control (PAC) Process Reports and Procedures **Reports and Procedury**

Process Flow Block Diagram – based on INCOSE Systems Engineering Handbook v. 4.0

We use a Comprehensive Process Flow diagram of all 31 Processes from Handbook



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This class uses Blackboard extensively



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To get a sense of what the Exam is like, we provide numerous Quizzes as well as a 120 Question practice Exam.

Preview Test: 120 Question Final Exam

* Test Information

Description

Instructions

Timed Test This test has a time limit of 2 hours. You will be notified when time expires, and you may continue or submit. Warnings appear when half the time, 5 minutes, 1 minute, and 30 seconds remain. [The timer does not appear when previewing this test]

Multiple Attempts This test allows multiple attempts.

Force Completion This test can be saved and resumed later. The timer will continue to run if you leave the test.

27 28 29 30 31 32	33 34 35 36 37 38 39	40 41 42 43 44 45 4	6 47 48 49 50 51 52 🔺
53 54 55 56 57 58	59 60 61 62 63 64 65	66 67 68 69 70 71 72	2 73 74 75 76 77 78
79 80 81 82 83 84	85 86 87 88 89 90 91	92 93 94 95 96 97 9	8 99 100 101 102 103 104
105 106 107 108 109 110	111 112 113 114 115 116 117	118 119 120	•

Can take as many times as needed. Different each time.

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	Close Window
	Question 1 of 120 > >
uestion 1	1 points Save Answer
<175> [5.1.1.3] Which three of the following are some of the Inputs to the Project Planning Process? (Choose three)	
□ Life cycle models	
Supply response	
Change Requests	
Project Performance Measures Data	

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Key Requirements of Certification



These elements of the INCOSE certifications are measurable tangible parameters consistent with ISO guidelines for a certification program.

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So What Level of Certification is Right for You?



If you have just started (or plan to start) practicing systems engineering or have recently graduated and are interested in systems engineering



 If you are a practicing Systems Engineer with more than five years of systems engineering professional work experience



If you are a systems engineering leader with recognized systems accomplishments and have many years of systems engineering professional work experience INCOSE Systems Engineering Professional (SEP) Exam Preparation Course

The Key Elements of INCOSE Certification (What is Certified?)

	SE Knowledge	Education	SE Experience	SE Leadership & Accomplishments
INCOSE ASEP.	Via an exam based on the INCOSE SE Handbook			
INCOSE CSEP	Via an exam based on the INCOSE SE Handbook	Via confirmation of technical degree (or additional experience, if required)	Via confirmation of applicant's and references written experience claims	
INCOSE		Via confirmation of technical degree (or additional experience, if required)	Via confirmation of applicant's and references written experience claims	Via oral review of applicant (and references, if required)

These four elements (education knowledge experience education, knowledge, experience, and leadership & accomplishments) allow for a variety of SE certifications to be earned.

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How Long Will It Take to Get Certified? There is no one answer. Much depends on the applicant.



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Certification Renewal Requirements

- Certification is Valid for
 - 3 Years for CSEP and must maintain INCOSE membership
 - 5 Years for ASEP and must maintain INCOSE membership
 - Indefinite for ESEP, but must maintain INCOSE membership
- Certification renewal requires
 - Minimum of 120 Professional Development Units (PDUs)
 - Renewal application
 - Continuing education log submittal
 - Must be submitted before current certification period ends
 - Up to 30 "excess" PDUs can be "carried forward"

INCOSE Certified professionals have an ongoing growth and learning obligation



PDUs for Certification Renewal (1 of 2)

Professional Development Activities	Credit	Renewal Limit
Technical Society Participation Category		
Be an INCOSE individual, senior, or student member	5 PDU/year	15 PDU
Attend Professional Technical Society local event/chapter presentation/exhibit	1 PDU/hour attendance	30 PDU
Attend Professional Technical Society Conference/Symposium	1 PDU/hour attendance	72 PDU
Participate on Professional Technical Society working groups, committees, etc.	1 PDU/hour of effort	No limit
Perform Leadership Role in Professional Technical Society at local, national or international level	1 PDU/hour of effort	No limit
Volunteer activities with youth in schools or community related to science, technology, engineering, and math(STEM)	1 PDU/hour of effort	72 PDU
Volunteer activities with community, school, or non-profit organizations that help them accomplish their technical needs	1 PDU/hour of effort	30 PDU
Earn an SE-relevant, exam-based, professional certification other than INCOSE SEP	5 PDU/certification	10 PDU

(all must be relevant to the practice of systems engineering) (Proof of all activities required if audited)

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PDUs for Certification Renewal (2 of 2)

Professional Development Activities	Credit	Renewal Limit
SE Course Work & Publication Category		
Complete a technical graduate level course	2 PDU/class hour	No limit
Attend educational course, tutorial, or seminar	1 PDU/hour	No limit
Teach professional development coursework, including	2 PDU/hour (prep)	
presentations not part of job function.	1 PDU/hour (teach)	40100
Write & publish SE article	5 PDU/article	No limit
Write & nublish SF book	30 PDU (primary author)/book	No limit
	10 PDU (contributing author)/book	
Attend vendor presentation with educational value	1 PDU/hour attendance	15 PDU
Attend venuor presentation with educational value	5 PDU/year limit	15100
SE Job Function Participation Category		
Receive Patent Award	10 PDU/award	No limit
Serve as designated lead systems engineer for a system, product	15 PDI /vear	
or service		43100
Lead organization to increase INCOSE systems engineering	5 PDU/year	15 PDU
certifications	5 T D C, you	10100
Volunteer (i.e., non-compensated) activities within your	1 PDU/hour of effort (10 PDU/year	30 PDU
organization related to engineering and science	limit)	20120

(all must be relevant to the practice of systems engineering) (Proof of all activities required if audited)

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All of the Renewal Material is Available On-line

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- ---- Why Get Certified?
- ---- Which Is Right For Me?
- The Certification Process
- Discounts & Agreements
- --- Certification Program History
- --- Certification Resources
- Certification Forms
- Certified torr of the
- Certification FAQs

Certification Forms

Home / Certification / Certification Forms



Note: these forms represent the factal application and renewal requirements for the INCOSE Systems Engineering Professional certification program as of their publication dates. If there are any conflicts between any other public certification information 1.5., the INCOSE certification website) and these forms, the content of these forms takes precedence. The INCOSE Concation Program Office is the final authority in the interpretation of the requirements on these forms.

- Initial Application for INCOSE ASEP or CSEP Certification
- Initial Application for INCOSE ESEP Certification
- Group Related Forms
- <u>Appeals</u>
- <u>Renewal of INCOSE Systems Engineering Certification</u>
- Special Accommodations Requests
- <u>Click Here to Download Certification Payment Form</u>

Initial Application for INCOSE ASEP or CSEP Certification

File	Туре	Size	Date	Download
Application for ASEP Certification Form 1A	PDF	1.32 MB	16 Dec, 2015	Por Download
Application for CSEP Certification Form 1	DOC	694.00 KB	10 Oct, 2014	Download
Instructions for Filling Out CSEP Applications Form 2	PDF	73.19 KB	08 Oct, 2015	Download
CSEP Certification Reference Endorsement Form 4B	PDF	148.35 KB	10 Oct, 2014	Download
CSEP Instruction Letter to References Form 4A	DOC	518.00 KB	10 Oct, 2014	Download

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Instructions for Filling out ESEP Certification Application Form 42

PDF 79.66 KB

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By the Way

- A lot of information in this brief came from an INCOSE Overview Brief
- Can find the original at the INCOSE SEP website:

http://www.incose.org/ certification/ CertResources



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Any Questions?







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App Prep	Examination	Preparation		
Webinar	Wed. Oct 19	Thur. Oct 20	Fri. Oct 21	
LIVE, ON-LINE	Pre Class Quizzes	Pre Class Quizzes	Pre Class Quizzes	
Class 1 Certification Overview & Application Help	Class 2/3 SE Overview & Approaches	Class 5 Tech Management	Class 7 Design	he Exar
	Lunch Break	Lunch Break	Lunch Break	or tl
Subm	Class 4 Project Planning	Class 6 Requirements	Class 8 Tech Processes	udy fo
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