Program Objectives

Acquire vital skills and knowledge in Systems Engineering through Caltech's Certificate Program. Our practical course, spanning 40 hours, will equip you with the ability to identify user needs and requirements, develop strong system designs, and effectively verify and validate cyber-physical products. Learn from industry experts and engage in hands-on activities using real-world cases.

You will learn how to:

- Conduct mission analysis and articulate a Concept of Operations
- Assess requirements through Context Diagrams, Functional Block Diagrams, and Design Structure Matrices (DSM)
- Architect systems, sub-systems, interfaces and interactions, hierarchies and hand-offs
- Evolve innovative design approaches for performance, trade-offs, and managing change
- Engineer for specialized outcomes, Design for Manufacturing, Design-to-Cost, Maintainability
- Define cost-effective verification and validation plans
- Effectively manage cost, schedule, risk, and accountability in engineering tasks and digital methods
- Plan, assess, and control traditional and Agile-driven technical programs spanning hardware and software
- Examine Model-Based Systems Engineering (MBSE) methods and approaches that use SysML

Learning Objectives

Our 40-hour program aims to enhance your systems thinking perspective throughout the engineering process, covering everything from gathering customer needs and requirements to systems design and integrated verification and validation. Additionally, you will learn the topics and approaches necessary for the INCOSE CSEP.
About Caltech

Caltech is a world-renowned science and engineering institute that marshals some of the world’s brightest minds and most innovative tools to address fundamental scientific questions and pressing societal challenges. Caltech prizes excellence and ambition. The contributions of Caltech’s faculty and alumni have earned national and international recognition, including over 45 Nobel Prizes. The Institute manages the Jet Propulsion Laboratory (JPL) for NASA.

In accordance with Caltech policy, CTME does not discriminate against any person on the basis of race, color, sex or sexual orientation, gender identity, religion, age, national or ethnic origin, political beliefs, veteran status, or disability in admission to, treatment in, or employment in its programs and activities.

Instructors

Ken Preston, DBA, has over 30 years of aerospace and defense experience with over 25 years in project management. As a lead for the Boeing C-17 Program, he has technical oversight of the parts management/obsolescence function and predictive obsolescence analytics. Dr. Preston was an engineering project manager of special projects in the Design Integration Office and project manager for supplier diversity.

Dr. Preston was selected Manager of the Year by the National Management Association (NMA) Southern California Area Council. He is a recipient of the NASA/American Society for Engineering Education Faculty Fellowship Program via Langley Air Force Base and served on the faculty at Hampton University. Dr. Preston received his DBA in business administration and MBA in project management from Columbia Southern University.

Rick Hefner, PhD, is currently the executive director for Caltech’s Center for Technology and Management Education, where he designs and develops learning programs for technology-driven organizations. He has over 40 years of experience in systems engineering, project management, and corporate management.

Dr. Hefner has also worked with companies in the aerospace, communications, electronics, and health sciences industries, including Aerospace Corporation, AeroVironment, Applied Physics Laboratory, Applied Materials, Ares Management, Boeing, DRS Technologies, Halliburton, Honeywell, Jet Propulsion Laboratory (JPL), John Deere, L3Harris Technologies, Maytag, Motorola, Northrop Grumman, AT&T, Raytheon, Schlumberger, Southern California Edison, St. Jude Medical, Toshiba, U.S. Navy, and Xerox.

Participants

This program is perfect for aerospace, defense, electronics, automotive/mobility, medical device professionals, and project managers in connected infrastructure for smart cities and environments. It caters to both seasoned and junior engineers, analysts, designers, and developers who want to advance their skills and knowledge in the industry. Systems Engineering Fundamentals is also an ideal prerequisite for professionals employing digital engineering model-based techniques. Regardless of your experience level, this course offers valuable insights and techniques to help you succeed in your career.

Why CTME?

Leaders who aspire to innovate and execute come to Caltech’s Center for Technology and Management Education (CTME). Here, you will do more than attend a class. You will develop new mindsets, technology skills, and leadership capacity to master the complex issues that challenge your organization today.

Instructors with real industry insight—Our instructors bring decades of real-world expertise and leadership in engineering, commercialization, manufacturing, operations, innovation management and executive accountability within technology-driven organizations and government agencies.

Achieve real impact in our on-demand classes with Caltech’s action learning approach. Our module exercises, relevant cases, and structured reinforcement learning empowers you to apply new knowledge and thrive in the face of new challenges.

Discover the freedom to learn your way with our flexible programs. Whether you prefer online classes, on-campus or international experiences, or self-paced learning, we have options for you. With frequent course offerings, you can easily fit your education into your busy schedule.

Take on the challenge with Caltech. Earn a distinguished certificate by completing full programs (40+ hours) or choose targeted learning for your objectives and career. Gain credit for continuing education and professional development.

About Caltech

Caltech is a world-renowned science and engineering institute that marshals some of the world’s brightest minds and most innovative tools to address fundamental scientific questions and pressing societal challenges. Caltech prizes excellence and ambition. The contributions of Caltech’s faculty and alumni have earned national and international recognition, including over 45 Nobel Prizes. The Institute manages the Jet Propulsion Laboratory (JPL) for NASA.

In accordance with Caltech policy, CTME does not discriminate against any person on the basis of race, color, sex or sexual orientation, gender identity, religion, age, national or ethnic origin, political beliefs, veteran status, or disability in admission to, treatment in, or employment in its programs and activities.