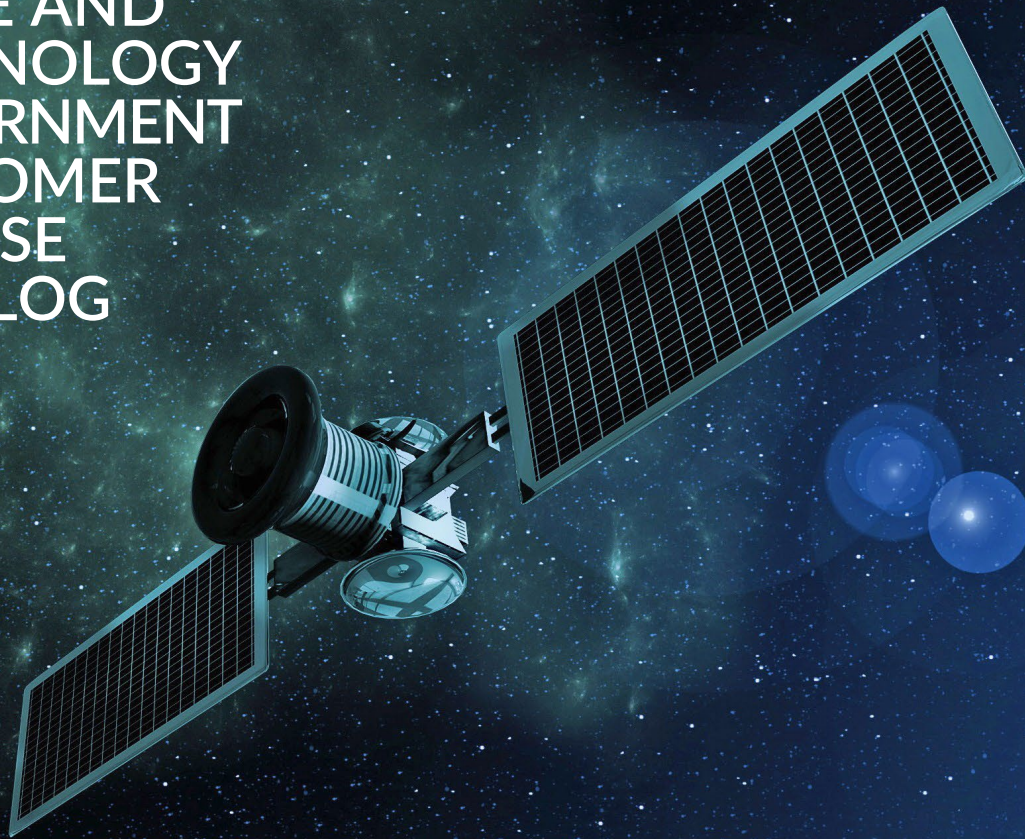


SPACE AND
TECHNOLOGY
GOVERNMENT
CUSTOMER
COURSE
CATALOG





The Aerospace Corporation is committed to nurturing the next generation of scientists and engineers by sharing the knowledge of our experts. A major way we do this is through Aerospace University, which offers a wide range of courses taught by our experts to our employees. This knowledge sharing also extends to our customers.

We encourage you to browse this catalog to learn more about the courses and curriculum offered with a purpose.

Aerospace University

ELIGIBILITY

Aerospace government customers may attend select Aerospace University courses within our technical curriculum on a space-available basis. Customers should consult their Aerospace counterpart to determine eligibility and begin the enrollment process.

ACCESS

Approved customers may access The Aerospace Corporation's Talent & Learning Center (TLC) to register for live training events, view on demand training videos, and browse the catalog.

PROGRAMS

Aerospace University maintains a diverse curriculum in the Space and Technology category. Courses are aligned under one or more of the following subjects.



Aerospace Overviews broadly introduce areas specific to Aerospace, the domain of space, space missions, systems engineering, and acquisition topics, providing an overview of the workings and management of space systems. Content and resources at this level are especially beneficial to newcomers -- those with little or no background in space systems.



Digital Applications and Practices covers topics that support the development of digital capabilities and other areas related to digital operation such as machine learning/artificial intelligence, agile development, and data visualization.



Operating in Space encompasses topics related to space itself. The space environment and astrodynamics may be obvious, but communicating with spacecraft is equally universal, as is the protection of space systems.



Space Systems and Spacecraft tackles topics pertaining to space vehicles, spacecraft, as well as the systems required to get them into space. Content in this area is for those who are interested in learning about specific systems and technologies, including the functions that maintain them.



Systems Engineering is a broad subject area that encompasses space system design, engineering, architecture, and other disciplines related to the work of Aerospace. Content in this category is intended for those who need to look across several technologies, going into some depth without being technology specific.

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AEROSPACE OVERVIEWS

Title	Description
Moon 101	This curriculum consists of a collection of videos where some of the world’s leading lunar experts discuss various aspects of the moon. They discuss the Apollo Missions, their importance and what we’ve learned as well as other exploratory moon missions. Moon 101 provides a snapshot of some of the most important and interesting discoveries about our moon.
Space 101	Space 101 provides a high-level overview of operating in space. It is designed for anyone who is new to working in the space sector and does not require prior knowledge of science technology.
Space Systems Overview	Space Systems Overview offers a basic introduction to the primary elements of space systems. This course is designed for those new to Aerospace, new to space, or unfamiliar with space systems.

DIGITAL APPLICATIONS AND PRACTICES

Title	Description
Agile Development Methodology: Program Management Perspective	Agile Development Methodology: Program Management Perspective provides attendees with a rapid foundation in the principles, values, techniques, roles, ceremonies, and artifacts of Agile and Scrum. Training also includes an Agile perspective on software architecture, requirements, design, test, and DevOps.
Agile Software Development Overview	Agile Software Development Overview is for anyone interested in learning about the fundamentals of working in an agile software development environment. It introduces key concepts and terms related to agile development methodology and eases the transition to an agile way of thinking by comparing these new ideas to familiar development processes, artifacts, and milestones traditionally associated with government programs.
Cloud Computing Overview	Cloud Computing Overview reviews the basic concepts and terminology for cloud computing to get everybody "on the same page". It is for anyone who is interested in discovering the basics of cloud computing and will benefit those looking for an introduction to the topic.



DIGITAL APPLICATIONS AND PRACTICES (cont.)

Title	Description
Digital Engineering Overview	This course provides an overview of Digital Engineering (DE), to include what it is, how it's used, and what benefits it is expected to provide to Aerospace and the broader space enterprise. In this course, we start by forging a clear understanding of what model-based systems engineering (MBSE) is and how it forms an important foundation of DE. However, we also explore the distinctness of DE and how it has the potential to fundamentally change the nature of almost every aspect of our jobs and the future of the industry.
Machine Learning Overview	Machine Learning Overview provides a basic understanding of machine learning and the machine learning process. This course is not intended to be a deep dive into the foundational mathematics upon which the algorithms are built, rather an overview of what different machine learning algorithms do and in what situations they should be applied.
Reducing the Software Risk in Space System Software	Reducing the Software Risk in Space System Software focuses more on the technical aspects of software assurance and less on policy. It covers various development methodologies (traditional and DevSecOps (Development Security Operations)). Students will learn an approach to securing ground software within the context of federal information systems. Federal requirements, coding standards, tool usage will be discussed as part of the solution to securing software.
Satellite Orbital Analysis Program (SOAP) Series	The Satellite Orbital Analysis Program (SOAP) is an Aerospace-developed interactive 3D orbit visualization and analysis program used to animate the motions of aircraft, ships, vehicles, satellites, spacecraft, and planets using a diverse set of prediction methods. Relevant domain areas include all phases of the space system life cycle, and encompass applications ranging from military tactical simulations to the modeling of deep space missions to the outer planets. Training includes an introduction to the software, application analysis, geospatial applications, and launch and RF modeling.
Software Architecture Evaluation	Software Architecture Evaluation will benefit anyone responsible for or involved in the evaluation of software architectures, such as software architects, system architects, software designers, and system designers. This course is an introduction to methods for systematically evaluating software architectures for fitness of purpose.
Software Architecture Introduction	Software Architecture Introduction benefits program, product, and acquisition managers; systems and software engineers; and engineers accountable for systems that interface with software. It introduces software architecture and its relevance to space programs.
Trusted AI	Trusted AI is intended for decision makers, program managers, chief engineers, systems architects, analysts, Artificial Intelligence (AI) scientists and practitioners from defense-related businesses interested in the application and ramifications of trusted autonomous systems. This course aims to provide a foundation for building trust in autonomous systems. Elements of autonomous systems are defined, and in that context, the perception of trust is explored.



OPERATING IN SPACE

Title	Description
Advanced Cyber Assessments	Participants of Advanced Cyber Assessments will leave with an understanding of key Risk Management Framework (RMF) implementation errors, can use this understanding to explain to their customers how those errors undermine the ability to manage cyber risk, and how the C-STARR methodology can mitigate these common shortcomings. Participants will understand that once the organization begins to measure information system sources of risk in a semi-quantitative manner, then aggregates those risk measurements in a logical and intuitive manner, those organizations will finally have the information necessary to begin to effectively manage cybersecurity risk.
Asteroid Deflection Simulator	Asteroid Deflection Simulator consists of an introduction to the Near Earth Object (NEO) problem, and an overview of Aerospace’s contribution in the area, including 1) Intercepting and disrupting an asteroid about to enter the atmosphere, 2) Intercepting an incoming comet, 3) Space policy considerations, 4) Near Earth Object Detection Using Artificial Intelligence, 5) Characterizing the material composition of distant asteroids directed at space situational awareness, and 6) Hands-on demonstration of a deep-space NEO Deflection App (NDA) developed jointly by Aerospace and NASA/JPL.
C2 in the Space Warfighting Domain	Command and control (C2) of forces and the systems that support them is the life-blood of military operations. In this new era where space has become a recognized warfighting domain, there are many questions surrounding the requisite actions required to orchestrate such operations. This course will not only explore these questions but will also posit candidate answers covering such topics as C2 basics including the targeting cycle, Joint and Combined military operations, global versus theater needs, building C2 for space, levels of decision making, challenges of C2 in warfighting, and current and future trends.
Cyber Ranges for Enhanced Space Mission Systems Resilience	Through the Cyber Ranges training, participants will gain an understanding of how testing space missions systems against advanced cyber threats can be done in a realistic prototyping and modeling environment. Topics covered during this course also include the National Cyber Range, cyber vulnerabilities and potential mitigations, and how the cyber range helps create new Defensive Cyber Operations tools which enhances Space Mission Resiliency.
Digital Radio Communication Overview	Digital Radio Communication Overview is for anyone interested in further understanding the basics of digital radio communication and is the foundation for other programs on communication systems. Selected examples emphasize satellite communication, but the principles apply equally to terrestrial wireless communication.



OPERATING IN SPACE



Title	Description
Mitigating Cyber Threats for Space Systems using Defense in Depth	Participants in Space Cyber Series – Mitigating Cyber Threats for Space Systems using Defense in Depth will gain knowledge of cybersecurity threat vectors and counter measures. They will be better positioned to provide guidance to their customers on meeting regulatory security compliance in addition to designing in security using defense in depth.
Reverse Engineering for Hardware and Software Systems	Reverse Engineering for Hardware and Software Systems will help participants become familiar with the technical tools and methods used to attack systems when source code and schematics are not available. This knowledge helps to thwart would-be attackers by helping to recognize potential attack vectors as the system is developed. Participants in this course will leave with deep understanding of technical tools and techniques used in the hardware and software reverse engineering process.
SIGINT Schoolhouse [classified]	The SIGINT Schoolhouse is a two-day course that provides an overview of the Integrated Overhead SIGINT Architecture (IOSA). The Schoolhouse delivers a series of presentations designed to provide insight into how IOSA is meeting today's threats and anticipating future SIGINT challenges.
Space as a Warfighting Domain [classified]	Bringing together various parts of existing courseware from the Aerospace Space Security and Cyber curriculum, this TS/SCI classified course addresses a wide range of topics fundamental to combat operations in the space domain.
Space Communications	This self-paced training provides an overview of space communications focusing on fundamental concepts such as what constitutes a link, signal power and noise, communication system components, and key metrics related to performance.
Space Domain Awareness Overview	Space Domain Awareness Overview provides an overview of situational awareness of space, officially known as Space Domain Awareness (SDA), with a focus on space protection and warfighting. The material is presented using the doctrinal categories of Detect/Track/Identification (DTI), Characterization (CH), Threat Warning and Assessment (TWA), and Data Integration and Exploitation (DIE) to explain SDA as a mission area and covers each topic in relation to the others. This material is relevant to anyone working in the space industry today as space is being tightly woven into the larger multi-domain fight.
Space Policy Overview	Space Policy Overview explains relevant decision-making processes in the context of historical and current space policy. Technical personnel, from entry level through top managers, will benefit from this class by gaining the ability to anticipate changes brought about by policy actions and engage effectively with policymakers when needed.



OPERATING IN SPACE

Title	Description
Space Policy: International Cooperation and Competition	Space Policy: International Cooperation and Competition aims to help participants understand the implications of international cooperation, competition, and law as applied to space policy.
Space Protection Awareness Fundamentals Series [classified]	Space Protection Awareness Fundamentals Series [classified] addresses a wide range of threats to space systems, from radio-frequency jamming to co-orbital antisatellite (ASAT) attacks. Each type of threat is examined in detail to present the fundamental physics and technology, a brief history, considerations regarding use and deployment, and potential countermeasures. This seminar is not a survey of current intelligence regarding threats to space systems; rather, it is a foundational presentation of the technology and underlying physics of these potential threats.
Spectrum Management Series	Spectrum management is the discipline of ensuring wireless systems have access to the spectrum they need without harmful interference that would degrade wireless services. Participants will gain a broad understanding of how RF spectrum is managed nationally and internationally. This will include key technical challenges, regulatory bodies, and registration processes to obtain and protect access to spectrum.
Understanding Risk Management Framework (RMF) Controls	Understanding Risk Management Framework (RMF) Controls focuses on the NIST SP 800-53 Revision 5 (National Institute of Standards and Technology Special Publication Titled: Security and Privacy Controls for Information Systems and Organizations) control catalog. It will start out by discussing what the catalog is, and the basic notion and structure of controls. It will discuss the differences between Revision 4 and Revision 5. It will then explore each of the 19 control families, the basic controls therein, and some of the more noticeable enhancements.
Using Cyber Ranges to Strengthen Defensive Cyber Operations	Using Cyber Ranges to Strengthen Defensive Cyber Operations will help participants become familiar with advanced cyber tools to help identify / reduce vulnerabilities and test fly concepts to enhance Space Mission System resilience. This will help identify concepts to “fight through” the inevitable cyber-attacks and cyber war.



SPACE SYSTEMS AND SPACECRAFT



Title	Description
Global Position System (GPS) Introduction	This course is geared toward government customers who need basic information about the acquisition and operation of the GPS.
GPS Intermediate	GPS Intermediate is designed for those who want detailed insight into GPS at the program, system, and subsystem levels. Note: certain portions of this course may require that participants have a secret clearance.
Ground Systems Overview	Ground Systems Overview is intended for those who seek to understand satellite ground system design, development, acquisition, and operations—and the vital roles played by Aerospace. This course provides an overview of satellite ground systems with the intention of introducing the key vocabulary and concepts necessary to discuss ground systems and understand their relationship to other elements of space systems and mission operations.
Launch Systems Introduction	Launch Systems Introduction is geared toward technical staff needing a broad overview of space launch and launch systems. This course introduces launch vehicles and how they work from both technical and operational perspectives.
Space Vehicle Integration and Test	Space Vehicle Integration and Test exposes participants to the key aspects for the integration and test phases including lessons learned, benchmarking, cost and schedule considerations, and traps to avoid. This course speaks to those who are or will be engaged in space vehicle integration and test planning as well as ongoing space vehicle program office support.
Space Vehicle Reliability Series	This series of videos will help viewers understand the appropriate reliability engineering activities related to elements of Mission Assurance. The lessons included in these trainings will prepare viewers to improve the probability of mission success during acquisition. The series covers key reliability tasks, examples, and things to look for that improve mission success. Instructors will review space vehicle reliability requirements and figures of merit and examine how they influence systems development. The series also provides a sense of key efforts that minimize failures and disconnects.
Spacecraft Propulsion Overview	Spacecraft Propulsion Overview provides an introduction to spacecraft propulsion. The course covers various propulsion system types, along with thruster details, relevant testing, mission assurance documents, and examples of notable anomalies.
Spacecraft Systems Design	Spacecraft Systems Design provides an overview of space systems spanning from microsatellites to large national systems and explains how they are conceived during the conceptual design phase. Students will be instructed by experienced systems engineers and subsystem specialists and will learn the processes used to go from requirements to an initial conceptual design.



SYSTEMS ENGINEERING



Title	Description
Architecture Design & Evaluation	Architecture Design & Evaluation is intended for systems engineers, program managers, and analysts that support architecture studies. This course provides instruction on the Architecture Design and Evaluation process. It teaches students how to apply a structured process to define and perform architecture-level trade studies.
Architecture Frameworks and Modeling: Overview	Architecture Frameworks and Modeling: Overview is an introduction to architecture frameworks and addresses what is meant by an architecture, and answer the question, "What are architecture frameworks?" Examples of architecture frameworks will be provided that are relevant to the Aerospace mission. The overview will also discuss Department of Defense Architecture Framework (DoDAF) 2.02, the current and official current version for the DoDAF.
Architecture Processes: Overview	Architecture Processes: Overview provides a top-level overview of systems architecture processes as defined in ISO 42020 standard. It is a recommended prior to follow-on programs in Aerospace University's architecture curriculum. This short program discusses architecture conceptualization, architecture evaluation, architecture elaboration, and architecture management, government, and enablement.
Art and Science of Systems Architecting	The Art and Science of Systems Architecting class will benefit anyone involved in systems architecting. This course presents the core concepts of systems architecting. It lays out the models and views used in architecting and specifically examines applications to distributed systems of systems.
Building Better Requirements	The Building Better Requirements Workshop will provide critical skills development to those supporting the operations/user community by offering hands-on practice writing these requirements with feedback. It is also relevant to those supporting acquisition program offices who need to understand how to collaborate on, interpret and implement such requirements.
Enterprise Planning and Portfolio Analysis Overview	Enterprise Planning and Portfolio Analysis is for those who would like an understanding of how Aerospace supports our customers utilizing Enterprise Systems Engineering frameworks to include support to agency budget build processes, capability road-mapping, and other acquisition strategy activities. This class describes a framework and several of the tools Aerospace utilizes to support our customers across the space enterprise when doing Enterprise Planning and Portfolio Analysis activities, including the interaction between enterprise architectures, program budgets and schedules, and programmatic risks and opportunities.



SYSTEMS ENGINEERING (cont.)



Title	Description
Enterprise Systems Engineering Overview	Enterprise Systems Engineering (ESE) Overview provides a top-level overview of ESE approach including the ESE processes that go beyond traditional program-level SE. The course will discuss strategic technical planning, capability-based planning analysis, enterprise architecture and conceptual design, enterprise evaluation and assessment, technology and standards planning, enterprise requirements definition and management, and opportunity and risk management at enterprise level.
MBSE: Learning SysML	MBSE: Learning SysML provides a theoretical introduction to Model Based Systems Engineering (MBSE) and the Systems Modelling Language (SysML). During the course, participants will get practical experience using a SysML tool to complete hands-on exercises. Non-Aerospace personnel must have their own working copy of Cameo Systems Modeler installed on their computer.
Model Based Reviews	Many program offices in government, industry, and FFRDCs are moving away from traditional document-based systems engineering practices and integrating model-based systems engineering (MBSE) approaches throughout the system lifecycle. Review artifacts are now often captured in models expressed using standardized modeling techniques (such as SysML) rather than documents, so it is critical that reviewers know how to access, mine, read, understand, and evaluate these model products.
Model Basics	This lesson covers key concepts of model-based systems engineering, beginning with an introduction to models and modeling in systems engineering, followed by a discussion of modeling languages, using SysML to illustrate examples. The instruction also includes an introduction to views and viewpoints and examples of leveraging the use of models and various views in reviews.
Model Based Systems Engineering (MBSE) Overview	Model Based Systems Engineering (MBSE) Overview is for those interested in learning how to leverage the use of model-based techniques and tools in systems engineering practice. This course is intended to introduce fundamental concepts of MBSE and provide examples to illustrate the use of model-based techniques and tools to address systems engineering challenges in practice.
Systems Analysis Overview	Systems Analysis Overview provides an overview of performance analysis, cost analysis, and risk analysis. It will focus on why these analyses are performed, what kinds of information can be generated, and how this information can be used in decision-making. The capabilities and strengths as well as the shortcomings and limitations of these analyses will also be discussed.
Space Systems Integration	Space Systems Integration will benefit technical staff and other individuals interested in learning about the basic concepts of systems integration (SI). The course provides descriptions of the processes, techniques and tools available to execute SI.



SYSTEMS ENGINEERING (cont.)



Title	Description
Systems Engineering Overview	Systems Engineering Overview introduces the standard systems lifecycle processes and a variety of methods and approaches used to implement those processes. It provides prerequisite knowledge for more advanced and specific topics related to Systems Engineering such as Enterprise Systems Engineering, Model Based Systems Engineering, and Systems Architecture.
Test Like You Fly	The “Test Like You Fly” (TLYF) Process discussed in this course is based on an approach that is broader than just “test”. Test Like You Fly introduces a codified, 7-step process. The TLYF process is defined as a prelaunch / pre-operational systems engineering process which translates mission operations concepts into operationally realistic tests.
Transforming Systems Engineering Reviews	Systems Engineering (SE) reviews are key milestones that have been conducted in much the same way for decades, with only minor incremental improvements along the way. This is an area where digital transformation efforts can be applied and would add value to programs. This presentation compares traditional and Digital Engineering-enabled reviews, and identifies opportunities to leverage digital engineering tools and practices to transform SE reviews for near-term pursuit.



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