COMPREHENSIVE SYSTEMS SKILLS (CSS)

Target Audience: All members of program/project teams.

Prerequisites: None.

Format: 5-day Center-based workshop is Center unique and provides scientists and engineers with a comprehensive knowledge of their Center's capabilities or core competencies through mini-courses on each delivered by subject matter experts.

Program Overview: The Center develops and designs the course through a template recommended by the NET program. Instruction includes establishing effective communication between management and technical teams. Experts provide a definition of each core competency, related trades and analyses associated with each process, products or outputs, and lessons learned by the expert. Major topics include the Center as a system; system engineering and technical integration of systems; design principles; and discipline systems and design processes. Center technical and management processes are discussed and the subject matter expert and knowledgeable retirees present their experience and lessons learned. Participants will understand their role and impact on system level operations and the benefits of effective communication on achieving mission goals.

DEFINING WORLD-CLASS PROCESSES (DWP)

Target Audience: NASA Project Managers and Software Engineers.

Prerequisites: None.

Format: 4-day seminar utilizes lectures, group discussions, and hands-on exercises.

Program Overview: In order for an organization to become best-in-class or world-class in quality, processes need to be defined so that people can clearly understand them and perform them in a repeatable way. This course will teach the participant the motivation, knowledge, and skills that are needed to define an organization's processes at a best-in-class level using a powerful process modeling approach that will cover process planning, requirements, design, modeling, verification, and validation. Participants will use QIC's "Expert Mode" to define and write processes that are short, concise, and usable. The course will also cover how to define critical process elements such as process purpose, entry and exit criteria, inputs and outputs, process roles and activities, process measurements, and procedures that support the process.

EXPLORATION SYSTEMS AND OPERATIONS (EXPO)

Target Audience: Engineers, System Engineers, Project Engineers, Researchers, Project Managers and Administrators responsible for the development, operation and management of exploration systems and space operations.

Prerequisites: Three years of experience or Introduction to Aerospace at NASA. It is beneficial, but not required, for the participant to have attended one of the following: the Earth Science Workshop, Space Science Workshop, Science Mission and System Design Workshop or Designing Space Missions and Systems.

Format: 5-day workshop integrating lectures, videos, animations, models and simulations as well as group problem solving activities to provide an excellent learning environment. This is a revised version of the HEDS Workshop.

Program Overview: A systematic, end-to-end view of most aspects of human spaceflight for Moon, Mars and Earth-orbiting missions and systems. Applied Space System Engineering at its best. A process-oriented approach is emphasized for creating effective concepts and architectures to meet Exploration Systems and Space Operations objectives. Major aspects of designing for crewed exploration missions and systems are addressed, including humans in space; design and sizing of space habitats; the space element; and orbits and trajectories. Hazards and mitigation techniques of the operating environment are presented. The surface element, deployment and construction strategies, and the principles, options, sizing, and application of subsystems are discussed. An overview of cost-reduction techniques and mission operations, making everything play together in a cost-effective manner, address critical elements of design. Integrating examples are used to illustrate the practical application of the processes, tools and techniques presented. Typical examples are a short duration lunar base mission and a long-duration Mars mission.

INNOVATIVE DESIGN ENGINEERING AND APPLICATIONS (IDEA)

Target Audience: NASA Project Managers, Engineers, Designers and Technicians.

Prerequisites: None.

Format: 3-day hands-on workshop featuring lectures, exercises and group discussions presented by Dr. Blaine Lilly, Ohio State University's Department of Mechanical and Industrial Engineering, faculty Fellow at NASA GRC and instructor in the NET MANU course. Dr. Lilly has visited every NASA Center and has a wide angle view of the workforce and type of work done at NASA.

Program Overview: Nowhere is creativity, imagination and resourcefulness more required than in the engineering work done at NASA. Imagination and creativity cannot be mandated or taught by flow diagrams. Creativity is elusive, but certain methods can be taught to help one capture the type of imagination that went into designing systems and hardware as complex as the Mars Pathfinder or as simple as a paper clip. The IDEA course examines the NASA design process in detail and compares it to the design model utilized in private industry, along with methods taught in today's engineering programs. Attendees are taught several techniques to help think creatively and are exposed to new approaches to the design function. Numerous real-world and NASA examples are revealed to demonstrate innovative design approaches. The course highlights past NASA successes and also challenges the attendees by focusing on the difficult design constraints inherent in an unmanned Mars soil sample return mission. At the conclusion of the course, attendees should understand the role of design within the systems engineering approach used at NASA and should leave the course with a renewed respect for NASA's past achievements along with the tools to help create future NASA successes.

INTRODUCTION TO AERONAUTICS (I-AERO)

Target Audience: Managers, Engineers and professionals involved in the production of cost-effective aircraft.

Prerequisites: None.

Format: 4-day hands-on workshop includes numerous design exercises and is structured to provide an understanding of the basics of aeronautics and the tradeoffs inherent in aircraft design.

Program Overview: NASA's vision for aeronautics, the NASA aviation safety program, a general aviation update, and an overview of aircraft design are presented as a foundation. Technical topics include the basics of aerodynamics; airfoil sections geometry and design; wings; high-life devices; and match number effects. Propulsion systems, aircraft performance, and handling qualities are explored. Participants are provided copies of *Introduction to Aeronautics: A Design Perspective* and the accompanying Aerodynamic software for use in exercises. Other air vehicles such as helicopters, uninhabited air vehicles (UAV), high altitude long endurance (HALE) aircraft, and hypersonic vehicles are also considered. The course integrates the technical data and design concepts into an approach considering technical tradeoffs in cost-effective design.

INTRODUCTION TO AEROSPACE AT NASA (IAN)

Target Audience: New Engineers at NASA, preferably within the first two years of service. Especially useful for administrative specialists and non-engineers who need to work with engineers to accomplish the NASA mission.

Prerequisites: This should be the first course an engineer takes at NASA.

Format: 5-day workshop includes lectures, videos, animations, noted NASA leaders and numerous group exercises. The course is structured to provide an understanding of the basics of NASA's space mission and systems, as well as aeronautics and the fundamentals of aircraft design.

Program Overview: This first course in aerospace at NASA is intended to motivate and stimulate new hires at NASA. Participants will gain a valuable understanding of the big picture of space and aeronautics at NASA. Insights into the organization and inner-workings of NASA are provided, along with an excellent opportunity to get to know other new hires and professionals within the organization. Probably the best single asset that participants gain is a framework for further study and growth within the NASA culture.

The course begins with an overview of the NASA organization and key programs and projects, and a vision for the future of exploration. Participants will receive an overview of activities at NASA Centers. Participants will also be introduced to engineering career development at NASA, as well as the NASA Engineering Training (NET), Academy of Program and Project Leadership (APPL), and other career development resources available at NASA. Evening activities may include discussions, exercises and activities with NASA leadership, astronauts and noted NASA individuals.

Participants will receive a "big-picture" overview of why space is important to America, trends in the space industry, space missions and systems, and a brief history of space explorers. Overall space system design and operations are discussed in the context of NASA and its important exploration and science missions and systems. Fundamentals of orbits, maneuvering in space, interplanetary travels and the space environment are covered in enough detail to provide a working knowledge of these areas. Key aspects of payload/instrument and spacecraft design are provided along with fundamental details of spacecraft subsystems. Participants also receive the basics of launch systems and space system operations. This is followed by discussions of policies and regulations, as well as space system cost.

Participants will receive an introduction to aircraft design, key aerospace building blocks, fundamentals of aerodynamics and basics of the systems and subsystems necessary for flight within an atmosphere. Air-breathing propulsion and overall aircraft performance will be discussed.

INTRODUCTION TO CMMI (I-CMMI)

Target Audience: Systems and software engineering managers and practitioners interested in understanding CMMI; assessment teams who will use the CMMI based method; and Systems and Software Engineering Process Group (SEPG/EPG) members leading process improvement.

Prerequisites: Initially offered to pre-identified project team members. Open enrollment for remaining program slots.

Certificate Program: The course can fulfill one of the prerequisites for CMMI-Based Appraisal training.

Format: 3-day workshop using lectures, exercises, and class discussions led by authorized SEI instructors, uses SEI provided materials, and is recommended for project teams intending to achieve an SEI rated maturity level.

Program Overview: An introduction and overview introduces participants to the Capability Maturity Model-Integrated (CMMI) including CMMI principles on engineering process maturity; maturity levels and process areas of the CMMI Model Staged Representation; and linkage of the process areas. CMMI interpretation and application are discussed. Participants are provided the rationale for process improvement; the architecture of the CMMI models; and sufficient understanding of the PA components to function on a CMMI-Based Appraisal Team. Systems and software engineering team members will be enabled to apply CMMI principles in their organizations.

INTRODUCTION TO RAPID PROTOTYPING (I-RP)

Target Audience: Introductory course for designers, engineers and technicians who have an interest in learning about the variety of rapid prototyping techniques used in research.

Prerequisites: None.

Format: 2-day, hands-on workshop features both classroom and laboratory learning.

Program Overview: Participants will be given a history and background of rapid prototyping technology along with descriptions, capabilities, and capacities of each rapid prototype technique. The course project will involve developing a simple STL model and processing it on various rapid prototyping equipment in the laboratory. Various case studies from NASA, industry and the Department of Deense will be presented, along with a discussion concerning future advancements in the field. Course referenced text and materials: *Rapid Prototyping Technology,* by Ken Cooper.

MANUFACTURING SYSTEMS AND PROCESSES (MANU)

Target Audience: Engineers and Designers interested in understanding hardware manufacturing principles and new related trends in industry.

Prerequisites: None.

Format: 4-day course uses lectures, discussions, and case studies.

Program Overview: Presents a comprehensive overview of current design systems and industry approaches to manufacturing issues such as lean manufacturing. Manufacturability and assembly issues are discussed to provide NASA design teams with shop floor advice for creating more effective and efficient hardware. Major topics include designing for manufacturability; assembly issues; concurrent engineering; and system level design. Processes are detailed including new and traditional machining processes, material selection, and metal casting and polymer processing. Adaptation of industry concepts such as mass production techniques to NASA is explored. Specific case studies are used to provide context for the concepts and practices presented.

MARS MISSION AND SYSTEM DESIGN (MMSD)

Target Audience: Engineers, System Engineers, Project Engineers, Researchers and Project Managers, as well as Researchers responsible for development, operation and management of exploration systems, including crewed and robotic missions to Mars.

Prerequisites: Four or more years of experience. Very helpful, but not required, to have attended the Space Science Workshop, Earth Science Workshop, Science Mission and System Design and Operations or Designing Space Missions and Systems prior to attending the MMSD.

Format: Innovative hands-on laboratory 5-day workshop integrating carefully selected lectures and a lot of problem solving using award-winning software packages and processes.

Program Overview: Intensive group dynamic, combined with easy-to-use integrated software provide an innovative hands-on laboratory environment for learning sophisticated, integrated methods of designing and operating Mars missions. Provides an integrated view of space mission design and operations from conceptual design and requirements definition, through spacecraft design, development, test, and launch, to development of mission operations concepts and ground infrastructure capabilities. Participants will be given a bona fide Mars mission objective and divided into competing groups to conceptually design a mission to meet the objectives at an acceptable lifecycle cost and risk. Each group will use a structured space system engineering approach to develop a mission concept and supporting space mission architecture to meet the stated objectives. Participants will use the references and tools that they bring to the exercise and resources available in their design center, as well as a complete and integrated Excel tool provided by TSTI (course instructors). Each group is expected to develop a credible design, perform a lifecycle cost estimate and identify critical requirements and system drivers for their concept. Each design will be explored in a one-hour technical proposal presentation. A design experience debriefing incorporates team action feedback and concludes with a lessons learned session.

MANAGING SOFTWARE PROJECTS WITH METRICS (MSWPM)

Target Audience: Project Managers, or individuals supporting the Project Managers of software-intensive systems development, maintenance, or acquisition.

Prerequisites: Experience or training in managing the development, maintenance, or acquisition of software-intensive systems by working for an organization at Level 1 or Level 2 of the Capability Maturity Model® for Software (SW-CMM®).

Format: 3-day course using lectures, exercises, and class discussions.

Program Overview: Teaches managers and practitioners how to implement and use metrics to plan, manage, and control software projects. Section one emphasizes the role of metrics in planning technical work, integrating related business goals, and implementing stakeholder issues into an overall project plan. Section two considers progressive use of measures. In addition to data-driven planning and tracking, participants learn about establishing quantitative objectives for performance and quality that are aligned with business objectives, emphasizing the use of measurement as the foundation for informed decision making. Upon completion, participants will understand the interrelationships among the Project Planning, Project Monitoring and Control, and Measurement and Analysis process areas of CMMI®.

MASTERING PROCESS IMPROVEMENT (MPI)

Target Audience: Software Engineering Process Group (SEPG) members responsible for Capability Maturity Model (CMM) improvement or members from organizations preparing to adopt CMM Integration models to guide process improvement.

Prerequisites: By invitation only. A CMMI introduction course or equivalent knowledge and experience is required.

Format: 5-day offering using lectures and case study exercises under the guidance of the Carnegie Mellon Institute Software Engineering Institute (SEI).

Program Overview: Presents a structured compendium of best practices in CMM-based process improvement called the Process Change Methodology (PCM) with an emphasis on how new SEPGs can work towards Maturity Level 2 while positioning for Maturity Level 3. Lectures on each PCM stage provide techniques and skills, including individual and group exercises to address process improvement scenarios, concluding with a debriefing and discussion of issues. Participants are provided with a systems-level view of planning and implementation; a toolkit of process improvement and change management skills and techniques; and a framework for addressing both technical issues and social issues encountered. Texts provided are *The Skilled Facilitator* by Roger M. Schwart and *Team Performance: Creating and Sustaining Results* by The Grove Consultants International.

OVERVIEW OF CMMI (O-CMMI)

Target Audience: Systems and software engineering managers and practitioners interested in understanding CMM-I.

Prerequisites: None.

Format: ½-day workshop introduces participants to the Capability Maturity Model-Integrated (CMMI).

Program Overview: The briefing introduces participants to the CMMI, providing a high level overview of the model and a basic understanding of the staged and continuous representations and their relationship to maturity and capability levels. The focus is on providing an understanding of the CMMI model architecture and the Maturity Level 2 process with exposure to Level 3 process areas as time allows.

SCIENCE MISSION AND SYSTEM DESIGN AND OPERATIONS (SMSDO)

Target Audience: Engineers, System Engineers, Project Engineers, Researchers and Project Managers responsible for science mission and system development operations and management.

Prerequisites: Introduction to Aerospace at NASA or three years of experience.

Format: 5-day hands-on workshop including lectures, videos, software and group problem solving.

Program Overview: Provides an integrated, end-to-end view of science mission and system design and operations from conceptual design and requirements definition, through spacecraft design and development, to development of mission operations concepts and ground infrastructure capabilities. Discussions on spacecraft design demonstrate ideas and tools to analyze and design space segment support for unmanned missions. A process-oriented approach for cost-effective design of viable and economical operations is presented. Cost reduction techniques and lifecycle cost modeling are detailed. The complete end-to-end design example for a remote sensing mission incorporates space mission architecture; orbit analysis and selection; the space environment and its impact; payload definition; mission operations and ground infrastructure; and launch vehicle selection. In four exercises and two group efforts, participants address key issues ranging from technical risk to cost, risk and effectiveness tradeoffs.

SCIENCE MISSION AND SYSTEM DESIGN AND OPERATIONS - LABORATORY (SMSDO-LAB)

Target Audience: Engineers, System Engineers, Project Engineers, Researchers and Project Managers responsible for development, operation and management of robotic space systems for exploration or science.

Prerequisites: Four or more years of experience. Helpful, but not required, to have attended the Earth Science Workshop, Space Science Workshop, Science Mission and System Design Workshop or Designing Space Missions and Systems prior to attendance. THIS IS A REVISED VERSION OF THE NET DESIGN EXERCISE.

Format: Innovative hands-on laboratory-based, 5-day workshop integrating carefully selected lectures and a lot of problem solving using award-winning software packages and processes.

Program Overview: Intensive group dynamic, combined with easy-to-use integrated software provide an innovative hands-on laboratory environment for learning sophisticated, integrated methods of designing and operating Earth-orbiting space missions. Participants are divided into several working groups. Each group uses a structured space system engineering approach to develop a mission concept and supporting mission architecture to attain mission objectives. Using a process-oriented approach, and tools and techniques distilled from decades of space system experience, each group develops a design, performs a lifecycle cost estimate, and identifies critical requirements. Participants are provided guidance on creating cost-effective missions to address broad and often ill-defined requirements. Lifecycle elements from development of a mission statement and objectives, through a complete system and subsystem description to a technical risk assessment are included. Each design is explored in a one-hour proposal presentation. A design experience debriefing incorporates team action feedback and concludes with a lessons learned session.

SEVEN AXIOMS OF GOOD ENGINEERING (SAGE)

Target Audience: NASA Engineers, Designers, Program Managers, Scientists, Engineering Technicians, Technologists and others who are interested in understanding the role of lessons learned in critical thinking, the design process and how to avoid classical design errors.

Prerequisites: None.

Format: 2 1/2-day workshop presented through lectures and case studies

Program Overview: As a "technology generation", better materials, processing techniques and analytical capabilities are available than in years past, however, design errors still occur. This can be attributed to a set of classical design axioms whose violation often leads to failure. According to the National Research Council, good design needs to be continually and actively promoted. Being a pioneer in space exploration and manned flight, NASA has a rich history of case studies which can be "tapped into" to improve the design process and products. Critical analysis of case studies is a practical method for impacting non-numerical engineering knowledge and skills to engineers. Course participants will review NASA and other case studies to determine some of the axioms of good design. They will also identify the common characteristics of design failures and techniques for avoiding them by analyzing historical failures both within the space program as well as cases from other areas of technology. Special emphasis will be placed on the assessment of high-risk technology.

SOFTWARE ACQUISITION CAPABILITY MATURITY MODEL (SA-CMM)

Target Audience: Personnel responsible for acquisition of software-intensive systems or outsourcing of software products and services.

Prerequisites: None.

Format: 2½-day workshop using lectures, exercises and group discussions.

Program Overview: Designed to give participants a basic understanding of the principles and activities of the Software Acquisition Capability Maturity Model (SA-CMM) and to show how use of this structured approach to process improvement can be applied to a variety of acquisition activities. The Model, based on the processes and practices of organizations that successfully acquire software systems and products, describes the key elements of managing and improving the acquisition process in an organization. The SA-CMM outlines a managed path for improving the process for acquiring software - from an ad hoc approach based on individual heroics to a mature, disciplined approach in which all aspects of the acquisition and oversight process are managed to enhance the organization's overall performance of work. The course is based on Version 1.03 of the Model and centers around the five maturity levels of the Model and their characteristic key process areas.

SOFTWARE CONFIGURATION MANAGEMENT (SCM)

Target Audience: Individuals responsible for configuration management or for improving processes used for configuration management, including configuration management specialists, software and systems developers, and Project Managers.

Prerequisites: None.

Format: 2-day workshop presented through lectures and small and large-group exercises.

Program Overview: Examines the activities required for effective software configuration management, examples of techniques used by organizations, and ways to document the practices for configuration management for a specific project. The class materials are built using ISO and IEEE software and systems standards and the maturity models of the SEI. In small group exercises, participants define an approach for configuration management and document it in processes and procedures that can be integrated into their own product development life cycle. Through guided exercises, the participants create their organization's configuration management plan, which can then be tailored by each project as needed.

SOFTWARE PROJECT PLANNING AND CONTROL (SPPC)

Target Audience: NASA Project Managers and Software Engineers.

Prerequisites: None.

Format: 16-hour Virtual Workshop is conducted by members of JPL's Software Quality Improvement (SQI) Project to all Centers over 4 days in 4-hour increments utilizing NASA's ViTS technology.

Program Overview: Provides both managers and software engineers with relevant information on understanding various software issues that may affect the success of their projects. The goals of this course are to provide participants with an increased understanding of the software issues relative to the planning and control of software projects, and the ability to more effectively oversee the software aspects of their projects. Topics covered include software management overview, lifecycles, requirements, planning and tracking, cost estimation, acquisition, development, configuration management, testing, quality, COTS software, reuse software, NASA Standards, and software management summary.

SPACE LAUNCH AND TRANSPORTATION SYSTEMS (SLTS)

Target Audience: Engineers, System Engineers, Project Engineers and Project Managers responsible for the development and operation of space launch and transportation systems, ascent, entry and descent vehicles.

Prerequisites: At least four years of experience.

Format: 3-day hands-on workshop using lectures, group discussions and exercises.

Program Overview: Emphasizes a process-oriented approach for creating effective and safe space launch and transportation system concepts. Focused on applying good design practices, lessons learned, sanity checks and rules of thumb to the difficult problem of getting off the surface, remaining in orbit and returning through an atmosphere and back to the surface safely and reliably. Discussions on vehicle design present practical, detailed approaches and tools to analyze and design manned and unmanned, reusable and expendable vehicles. Major topics include creating alternative concepts and architectures; launch vehicle conceptual design; and launch operations concept and architecture. Hazards and mitigation techniques of the operating environment are presented. The system engineering process for SLTS development and operations principles, options, sizing, and application for subsystems are a major focus. Integrating examples are used to illustrate the practical application of the processes, tools and techniques presented.

SYSTEMATIC SOFTWARE TESTING (SST)

Target Audience: NASA test professionals, test managers, project leaders, quality analysts, and developers.

Prerequisites: Attendees should be “software knowledgeable” with at least minimal test or software experience.

Format: 3-day seminar utilizes lectures and group discussions to lead participants from test planning through achieving testing goals.

Program Overview: Purpose is to teach the techniques necessary to shift from ad hoc, uncoordinated efforts to systematic, integrated software testing through a process that produces measurable results that can be incrementally improved. Testing is handled as an integral part of the development process (resulting in testware), using the same systems engineering discipline as software development. The process of test development reveals problems in software specifications, resulting in cleaner code. The testing process illustrated in this seminar focuses on prevention as well as detection of software defects. Risk analysis helps you focus on the important testing issues. Trace tests back to requirements, design, and code to reveal what has been tested and what remains to be tested. This seminar leads participants through test planning, test analysis, and test execution, showing how to set and then effectively satisfy testing goals.

SYSTEM ENGINEERING FUNDAMENTALS-1 (SEF-1)

Target Audience: Engineers, System Engineers, Project Engineers and Project Managers responsible for creating integrated engineering systems. This is a first course for engineers at NASA in system engineering.

Prerequisites: Two years of experience.

Format: 5-day hands-on workshop features lectures and group exercises, with emphasis on actual system engineering problems of all types with emphasis on NASA missions and systems.

Program Overview: The primary processes and tools for upfront system engineering are provided and explored in this "first course for engineers" in system engineering. The course begins with an overview of the system engineering process, followed by the organizational and business drivers for system engineering. The group is organized into teams to select a project with which to exercise the processes in the course.

The groups identify stakeholders and associated requirements and follow up by generating, evaluating and selecting basic concepts. Then participants learn to drive to the proper system scope, create context diagrams and develop case scenarios to help get to customer objectives, requirements and constraints. Participants learn to use a requirements management tool, and an associated functional modeling tool (software provided) to create a basis for the project. Participants learn the fundamentals of lifecycle cost analysis, as well as risk management and other program issues.

SYSTEM REQUIREMENTS (REQ)

Target Audience: System Engineers, Engineers and Scientists responsible for writing or reviewing hardware, software or systems requirements.

Prerequisites: None.

Format: 3-day hands-on workshop features lectures and exercises, and reviews of participants' own projects and products including discussion of solutions to existing problems.

Program Overview: Defines the steps of a good requirements writing process; details the differences between good and bad requirements and how to avoid problems later in the lifecycle process; and how to organize requirements into a specification. Best practices for systems specification, as documented by the leaders in systems, are resented. Major areas addressed include eliciting requirements from stakeholders; organization, analysis and prototyping; recording and management; and preparing the specification text. Emphasis is given to management of the requirements team and using a goal-centered approach rather than a technology-centered, time-sequential approach. Data and techniques required to insure full lifecycle management of requirements is provided and applied in lectures and hands-on exercises.

SYSTEM REQUIREMENTS – TEAM (REQ-T)

Target Audience: Teams of System Engineers, Engineers and Scientists responsible for writing or reviewing hardware, software or systems requirements.

Prerequisites: REQ-T is designed to address the needs of teams. Individuals must apply through the REQ course.

Format: 3-day Center-based hands-on workshop features lectures and exercises, and reviews of the teams' own projects and products including discussion of solutions to existing problems.

Program Overview: Designed to address the needs of an existing team and topics are tailored to team requirements. Defines the steps of a good requirements writing process; details the differences between good and bad requirements and how to avoid problems later in the lifecycle process; and how to organize requirements into a specification. Best practices for systems specification, as documented by the leaders in systems, are presented. Major areas addressed include eliciting requirements from stakeholders; organization, analysis, and prototyping; recording and management; and preparing the specification text. Emphasis is given to management of the requirements team and using a goal-centered approach rather than a technology-centered, time-sequential approach. Data and techniques required to insure full lifecycle management of requirements is provided and applied in lectures and hands-on exercises.

TOPICS IN ENGINEERING (TE)

Target Audience: NASA engineering community and private sector personnel.

Prerequisites: None.

Format: 2- or 3-day workshop, usually co-sponsored by a university, features presentations and knowledge sharing on the latest developments on selected topics of particular interest to the engineering and aerospace community.

Program Overview: The format includes presentations by top industry and Government presenters in half-hour overviews of the latest developments in engineering on a selected topic of high interest to the engineering community. The topic is further explored in panel sessions. Vendor exhibits provide further information of interest to the community. Past topics have included Nanobiotechnology and Emerging and Future Computing Paradigms and Their Impact on the Research, Training and Design Environments of the Aerospace Workforce.

VERIFICATION, VALIDATION AND TEST OF SYSTEMS (VV&T)

Target Audience: Systems and software engineering managers and practitioners interested in understanding VV&T and its role in the project life cycle.

Prerequisites: None.

Format: 5-day workshop using lectures, case studies, and class discussions.

Program Overview: An introduction and overview of VV&T is provided including concepts, terminology and requirements; regulatory aspects; and documentation requirements. Failure analysis is addressed in depth including the causes of failures in computer-based systems and hardware, software and system failures. Test attributes of a successful testing program and the issue of risk identification and management as it relates to VV&T are also discussed. Participants join in a review and discussion of various VV&T techniques and the stages of the life cycle in which they can most effectively be applied. Case studies provide real-life examples of techniques and their application.

Revised 09/27/04

***Information**: Registration – contact your Center Training Office. For additional information contact RGI at 703-820-4900 or rgi-inc@earthlink.net.*