SYS/SDOE 605

SYSTEMS INTEGRATION

School of Systems&Enterprises

THIS MODULAR COURSE CAN BE TAKEN FOR GRADUATE CREDIT TOWARDS A MASTER'S IN SYSTEMS ENGINEERING OR AS PART OF A PROFESSIONAL DEVELOPMENT PROGRAM.

MODULE DESCRIPTION AND OBJECTIVES

This course is designed to provide the participants with an understanding of the scope of systems integration (SI), different SI approaches to design, architect, implement, and test integrated systems, tools and techniques to measure the successful implementation of SI and best practices. The objective of the course is to provide the students an understanding of the technical and business process issues involved in systems integration. Our end-to-end approach focuses on how integration issues can be addressed up-front to minimize integration related complexities and challenges later on in the system engineering process. The SI activities have to be directed towards the design and architecture of systems that are easy to integrate or in other words "integration-friendly" or "integration-ready" (ready to be integrated) systems. Therefore, the challenge is to understand the impact of system design and architecture on integration complexity. The focus of our approach is on pre-empting integration issues upfront in the process. Identifying the best practices that will ensure this upfront focus is the challenge that projects need to manage.
The students will appreciate the role of system architecture and design in influencing system integration complexity, theory and practice of business process integration, legacy integration, new systems integration, COTS integration, application integration, architecture integration, and integrated program management. Specific focus will be given to issues of interoperability, openness, interface control and management, verification and validation, system testability, and the final acceptance of the system.

MODULE ORGANIZATION

This modular course combines lectures, readings, case studies, and in-class exercises to develop an understanding of the systems integration concepts. Lastly, the team project on a failed or successful system integration project allows participants to apply and integrate their knowledge in a team environment.

MODULE AUDIENCE

This modular course would be of interest to systems integrators, systems engineers, systems designers and architects, program and project managers, and test planners and managers. People who are involved in any aspect of systems integration and testing would find the module useful.

COURSEWARE

Participants receive a binder containing course notes and additional readings specifically organized for this course.

MODULE DIRECTOR

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MODULE REGISTRATION & INFORMATION

For additional information:
Contact **Beth Austin DeFares**, Beth.Defares@stevens.edu, 201.216.5362 or download the SDOE Graduate Enrollment Form from our website at **www.stevens.edu/SDOEenroll** and fax it to 201.216.5080.

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STEVENS Institute of Technology

DAY 1 SESSION 1	**Overview** – Introduce the course content, teaching methodology, guidelines for the exams and the final project and their grading. The concept of systems integration will be introduced with the discussion on definitions, scope, and approaches. This will also include introductions of instructor and participants, setting-up expectations, defining course objectives, course content, exams and grading, final project, and schedule of topics.
SESSIONS 2 & 3	**System Integration (SI) Process, Issues, and Planning** – Understand the concept, approaches, strategies, planning, and drivers for systems integration. Topics covered will include: SI Planning, A Comprehensive View on SI, Drivers for SI, Impact of Complexity, Flexibility, Modularity on SI, Attributes of Operationally Integrated Systems, Integrating Existing vs. New Systems: Legacy Systems Integration, Problems Posed by Legacy Systems, Rationale for Legacy Integration, and Strategies for Legacy Integration. Boeing 777 – Systems Integration Case Study
DAY 2 SESSION 4	**Impacting SI through Architecture and Design** – Understand the role of system requirements, architecture, and technology maturity selection in SI in order to increase the odds of an efficient and successful integration, verification and validation. Provide tools to aid the system engineer to assess the goodness of requirements, architecture, technology maturity selection, and risk assessment & mitigation.
SESSION 5	**System Integration Maturity** – Understand the impact of system integration activities and their maturity level on system integration complexity (Technical, Programmatic, Configuration, Operational, and Organizational), system integration readiness, and system operational effectiveness. Provide tools and best practices to aid the system engineer to assess the maturity of SI activities, their impact on SI readiness and operational effectiveness, and risk assessment & mitigation.
DAY 3 SESSION 6	**System Verification** – Understand the objectives, process, activities, methods, and approaches of verification. Challenges and Issues will also be discussed.
SESSION 7	**System Validation** – Understand the objectives, process, activities, methods, and approaches of validation. Discussion on Conceptual Validity, Requirements Validity, Design Validity, Operational Validity, Acceptability and their differences will be covered.
DAY 4 SESSION 8	**Interface Control and Management** – Understand the role of interface control and management in SI. Topics include: definition, assessment, and documentation of interfaces, Interface Control Documents (ICDs), Key Components of Interface Control, Interface Management, Interface Architecture, System Interface Agreement, and Interface Definition Language (IDL) and Technologies.
SESSION 9	**Commercial-off-the-shelf Products Integration** – Understand the issues related to integrating COTS products, the uniqueness of such issues, factors affecting COTS integration, benefits of COTS, pitfalls of COTS, Critical Success Factors, and challenges.
DAY 5 SESSION 10	**System Integration Final Project Presentations;** Take-home Final Exam; Session Evaluation and Conclusion.