

SYST 622 / ECE 675 System Integration and Architecture Evaluation (3.0:3)  
Recommended Co-requisite: SYST 621 or ECE 674 or permission of instructor

Spring 2006

*Description:* Covers the system integration problem, the role of architectures in systems integration, integration in a system of systems and a federation of systems. Evaluation of architectures, measures performance and effectiveness. Assessment of system capabilities. Analysis of alternatives.

This course is part of the degree track, concentration, and certificate in architecture based systems integration. There is much interest today in the engineering of systems that are comprised of other component systems, and where each of the component systems serves organizational and human purposes. These systems families are often categorized as systems-of-systems, or federations of systems. The design of architectures is a major ingredient in the design of systems families and provides the conceptual basis for achieving system integration. Towards this end, the Department of Defense has issued new regulations for acquisition of systems. These require an architecture-based approach and focus on how a proposed system will be integrated with other existing or planned systems. Studies in this area cover: formulation of the system integration problem, definition of architecture frameworks, use of structured analysis and object oriented methodologies for the design of architectures, modeling and simulation for evaluation of architectures and approaches to integration. Both defense and industrial applications are considered. This is the capstone course in the sequence. It addresses the system integration problem using architectures as the basis and then addresses the evaluation of architectures in terms of the capabilities they provide.

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Prof. Andrew P. Sage, Office STII – Room 311, Phone: 703-993-1506, Fax: 703-993-1521. Email: [asage@gmu.edu](mailto:asage@gmu.edu).

Course Call numbers: SYST 622 001 10521; ECE 675 001 12303

Spring 2006: Tuesday 4:30 – 7:10 pm in Innovation Hall Room 131

**COURSE OUTLINE** (subject to change as this is a revised course)

- 1/24/2006 Overview, System of Systems, Introduction to WebCT
- 1/31/2006 System of Systems, Families and Federations of Systems, System Families
- 2/7/2006 Capability Based System of Systems Planning, Networked Systems of Systems
- 2/14/2006 Enterprise Architecture Body of Knowledge I
- 2/21/2006 Enterprise Architecture Body of Knowledge II
- 2/28/2006 Maturity Models, and Integration and Architecting Development Models
- 3/7/2006 Systems of Systems Interoperability
- 3/21/2006 Issues in Architecture Evaluation; Mid Term exam due
- 3/28/2006 System Effectiveness Analysis
- 4/4/2006 Structural Methods, Relating Structure to Capability
- 4/11/2006 Term Paper Presentations, Term Paper Report Due,
- 4/18/2006 State Space methods
- 4/25/2006 Organizational Architecture design
- 5/2/2006 Adaptive Architecture design
- 5/9/2006 Final Exam

Course notes will be made available for downloading through WebCT. The first seven lectures of the course will be given by Dr. Sage; the remaining ones by Dr. Levis.

References: Sage, A. P. and Rouse, W. B. (Eds.), *Handbook of Systems Engineering and Management*, John Wiley and Sons, New York, 1999.

Contemporary literature is available and is either on the Internet or will be made available. These references concerning systems integration and related issues in architecting for systems integration and evaluation will be of much use, and experience will be gained in the Internet as a research tool during the course. A course web site on WebCT will be operational and put to much use.

*Homework:* The first part of the course will have a term paper assignment, including a written report and oral presentation. The second part will have weekly homework assignments.

*Grading:* 50% - examinations; 20% - term paper and presentation; 30% - homework assignments. One take home exam and a final will be given. There will be a term paper assignment, including a written report and oral presentation.