

**SYST 619 / ECE 672 / IT 850 / SYST 850 Introduction to Architecture Based Systems Engineering. (3:3:0).**

**Spring 10** Lifecycles in systems engineering and the role of systems integration and architecting in these. Conceptual frameworks for systems architecting. Structure, function, and purpose of systems architecting and integration. Risk management and systems architecting and integration. User requirements and functional specifications in systems architecting. Prerequisites: SYST 510 or 520 or permission of instructor.

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 system families, 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, interoperability concerns, the Lead Systems Integrator. Both defense and industrial applications are considered.

References:

Sage, A. P. and Rouse, W. B. (Eds.), **Handbook of Systems Engineering and Management**, John Wiley and Sons, New York, 2009 (2<sup>nd</sup> Edition).

Sage, A. P., **Systems Management for Information Technology and Software Engineering**, John Wiley and Sons, New York, 1995.

Sage, A. P., **Systems Engineering**, John Wiley and Sons, 1992.

A plethora of contemporary literature, available on the Internet concerning systems integration and related issues in architecting for systems integration. This 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 Blackboard will be operational and also put to much use.

Instructor: Andrew P. Sage, Office: School of Engineering, Room 2240, Phone: 703-993-1506, Fax: 703-993-1521 ,Email: [asage@gmu.edu](mailto:asage@gmu.edu), Office Hours by Appointment.

Course Call Numbers SYST 619 001 (12914), SYST 619 623 (20688), ECE 672 001 (12823) IT 850 001 (TBA) SYST 850 001 (TBA)) Spring 2010 Thursday from 4:30 PM to 7:10 PM in Room IN 132 (Innovation Hall).

Grades: 50% - examinations; 15% - term paper; 35% - home assignments. Two take home exams will be given. There will be a term paper assignment in the general area of systems architecting and integration, including a written report, and weekly assignments.

SYST 619, ECE 672, IT 850, SYST 850 - Detailed Syllabus and outline, by dates (subject to change)

1. An Overview of Architecture Based Systems Engineering, Introduction to Blackboard - 21 January 2010
  2. Architectural Frameworks and Architecture Development Processes I – 28 January 2010
  3. Architectural Frameworks and Architecture Development Processes II, 4 February 2010
  4. Architectural Issues in Engineering System Families (System of Systems), 11 February 2010
  5. System Family Integration and Architecture Frameworks I, 18 February 2010
  6. System Family Integration and Architecture Frameworks II, 25 February 2010
  7. DOD Series 5000 and JCS 3170, DODAF, JTA , MODAF– the three views, 4 March 2010
  8. No Class 11 March 2010– Mid Term Break
  9. COTS and Cost Estimation in Systems Architecting and Integration I, Mid Term due 18 March 2010
  10. COTS and Cost Estimation in Systems Architecting and Integration II, 25 March 2010
  11. Architecting and Integration in a System of Systems, 1 April 2010
  12. Case Studies in Architecting and Systems Integration, 8 April 2010
  13. Architecture and Integration in Capability Based Planning, 15 April 2010
  14. Path Dependence, Network and Complex Adaptive System Architecting and Integration, 22 April 2010
  15. Introduction to service Oriented Architectures, 29 April 2010
  16. Final exams due 6 May 2010
- APS. 13 December 2009