

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

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 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.

References:

- Sage, A. P. and Rouse, W. B. (Eds.), **Handbook of Systems Engineering and Management**, John Wiley and Sons, New York, 1999.
- 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.
- Keeping the U.S. Computer Industry Competitive: Systems Integration**, National Academy Press, 1992.

A plethora of contemporary available on the Internet concerning systems integration and related issues in architecting for systems integration 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.

Instructor: Andrew P. Sage, Office: STII, Room 311, Phone: 703-993-1506, Fax: 703-993-1521 Email: asage@gmu.edu

Course Call Numbers SYST 619 001 74309, ECE 672 001 74310
Fall 2004 Tuesday from 4:30 PM to 7:10 PM in Room IN 205 (Innovation Hall).

Grades: 50% - examinations; 20% - term paper and presentation; 30% - home assignments. Two take home exams will be given. There will be a term paper assignment, including a written report and oral presentation, and weekly assignments. Presentation: Each student will give a seven (7) minute formal oral presentation and prepare a term paper in the general area of systems architecting and integration.

SYST 617, ECE 672 - Detailed Syllabus and outline, by dates (subject to change) – Fall 2004

1. An Overview of Systems Engineering and Management, Introduction to WebCT – 31 August
2. The role of architecting in systems integration, 7 September
3. System Families - System of Systems; Federation of Systems, 14 September
4. Architecture Frameworks I, (Zachman et al.), 21 September
5. Architecture Frameworks II, 28 September
6. DOD Series 5000 and JCS 3170, DODAF, JTA – the three views, 5 October
7. No Class – Columbus Day Class Shift, 12 October
8. The architecture development and evaluation process, 19 October, Mid Term exams due 19 October
9. Enterprise and Information Technology Architectures and integration, 26 October
10. Risk management and cost estimation in architecting and systems integration, 2 November
11. Architecture and Integration in Capability Based Planning I, 9 November
12. Architecture and Integration in Capability Based Planning II, 16 November
13. Path dependence, network and complex adaptive effects in system integration, 23 November
14. Evolutionary and emergent approaches in systems integration, 30 November
15. Term paper presentations, term paper report due, 7 December
16. Final exams due 14 December.

APS. 9 August 2004