IT 850 / SYST 622 / ECE 675 System Integration and Architecture Evaluation   (3:3:0)
The System of Systems Integration Problem – Human, Organizational, Societal Cultural, Economic, and Technological aspects. The Role of Architectures in Systems Integration. Integration in a System of Systems and a Federation of Systems. Model Based Architecture, Design, and Integration. Systems of Systems Interoperability. Evaluation of architectures. Measures of Performance and Effectiveness. Assessment of System Capabilities. Analysis of Alternatives. Co-Requisite SYST 621.

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.

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.

Instructors
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Course Call Numbers IT 850 001 11646
Fall 2004 Tuesday from 4:30 PM to 7:10 PM in Room IN 222 (Innovation Hall).

Grades: 50% - examinations; 20% - term paper and presentation; 30% - home 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.

IT 850. SYST 622, ECE 675 - Detailed Syllabus and outline, by dates (subject to change) – Spring 2005
1. Overview, System of Systems, Introduction to WebCT – 25 January
2. System of Systems, Families and Federations of Systems, System Families, 1 February
3. Capability Based System of Systems Planning, Networked Systems of Systems, 8 February
4. Enterprise Architecture Body of Knowledge I, 15 February; II, 22 February
5. Maturity Models, and Integration and Architecting Development Models, 1 March
6. Systems of Systems Interoperability, 8 March
7. No Class – Mid Term Break, 15 March
8. Issues in Architecture Evaluation: 22 March, Mid Term Exams Due
9. System Effectiveness Analysis; Measures, 29 March
10. Key Thread Analysis, 5 April
11. Structural Methods, Relating Structure to Capability, 12 April
12. Term Paper Presentations, Term Paper Report Due,19 April
13. State Space Methods, 26 April
14. Simulation, 3 May
15. Final Exams: 10 May.
APS AHL. 22 November 2004