SYST 621 (SWE 641) **Systems Architecture for Large Systems** (3:3:0)
This course is primarily concerned with an intensive study of role of architecting in systems (and software) engineering. Architectural frameworks and architecture development processes. The relationships between different architectural frameworks and the resulting architectural representations, and the methodologies used to obtain them, are emphasized. Approaches are based primarily on such systems engineering constructs as structured analysis, and primarily software engineering constructs such as object orientation. These are used to develop architecture representations or views such as to enable determination of an executable model of the architecture which may be used for further study through simulation and associated evaluation of system measures of performance. We will examine several architectural perspective representations in terms of purpose, functional and structure of the system to be engineered. The concluding portions of the course will examine the Unified Modeling Language, including the new UML version 2.0 especially developed to support systems engineering use, and contrasting and complimentary issues relative to architectural representations in UML and structured analysis representations. Architectural examples from current practice, including the C4ISR architecture and the Department of Defense Architectural Framework, are studied. Prerequisites: SYST 520 or INFS 501 or equivalent.

Text Book: There is no required text for the course. A WebCT site will be employed for distribution of the course material, including all lecture overheads, relevant journal papers, and the like. Students will be able to obtain and submit assignments through WebCT. The URL for this is http://webct38.gmu.edu. A plethora of contemporary literature is available on the Internet concerning systems architecting and experience will be gained in the Internet as a research tool during the course. Professors Alex Levis and Lee Wagenhals have done much to develop SYST 621 and, hopefully, the effort this semester will extend this development. They have developed a Web Site for the course available through http://viking.gmu.edu. After accessing this location go to courses, and select SYST 621, and you will find their past overheads, homework, and tests.

Reference Text (not required, nor even very extensively used in the course):
Sage, A. P. and Rouse, W. B. (Eds.), ***Handbook of Systems Engineering and Management***, John Wiley and Sons, New York, 1999.
Benrus, P., and Nemes, L., ***Handbook of Enterprise Architecture***, Springer Verlag, 2003.
Maier, M. and Rechtin, E. ***The Art of Systems Architecting***, 2nd Edition, CRC Press, 2000.

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SYST 621 001 05015 Fall 2003 Tuesday 4:30 to 7:10 PM in Room IN 208 (SWE 641 001 04989)

Grades: 50% - examinations; 20% - term paper; 30% - home assignments. Two open book timed (15 hours each) take home exams will be given, one approximately at the middle of the semester and one at the end of the semester. There will be a term paper assignment on systems architecting.

SYST 621 (SWE 641) - Detailed syllabus and outline, by dates (subject to change) – Fall 2003
1. An Overview of Systems Engineering and Management, Introduction to WebCT, 26 August
2. Architectural Frameworks and Architecture Development Processes, 2 September
3. Architectural Issues in Engineering a System of Systems, 9 September
4. Structured Analysis: Functional Decomposition and Activity Modeling, 16 September
5. Structured Analysis: Data Flow Diagrams and Data Modeling, 23 September
6. Structured Analysis: Rule Modeling, 30 September
7. Structured Analysis: Dynamics Modeling, System Dictionary, and Model Concordance, 7 October
8. Entity-Relation Diagrams and Review, 21 October (No class 14 October - Columbus Day Holiday)
9. Object Orientation: Basic Object Oriented Principles and UML, 28 October, 4 November
10. Object Orientation: Case study, 11 November
11. Object Orientation (UML) and Structured Analysis: Contrasts and Complementarity, 18 November
12. Executable Models and Architectural Simulations: Introduction to Petri Nets, 25 November
13. Evaluation of Architectures and Measures of Effectiveness, 2 December
14. Mid Term Exams Due 21 October, Term Papers Due 9 December, Final Exams Due 16 December

APS: 8 August 2003