

# ENMA 660 – System Architecture and Modeling

Fall 2007, Tuesday 19:10 PM – 21:50 PM

## Instructor:

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Office Hours:	Monday	8:45AM – 11:45PM (VMASC)
	Tuesday	1:30PM - 4:30PM (ODU)

## Overview

Students will learn the essential aspects of the systems architecture paradigm through development and analysis of multiple architecture frameworks and enterprise engineering, such as IDEF0, TOGAF, DoDAF, and OPM. Emphasis is placed on systems modeling and enterprise engineering in support of system-of-systems challenges. The course will start with mathematical foundations (discrete mathematics and graphs) and will lead to an exemplifying system model using a professional software package. The course teaches the basics of system modeling required for successful engineering of systems as well as the use of M&S in support of this process.

Topics of class components are

- Overview System Modeling and Architecture
- The System Engineering Design Process for Complex Systems, Virtual Systems and Systems-of-Systems
- Modeling of Systems and Architecting Paradigms
- Overview of Modeling Techniques:
  - Graphical Modeling
  - Set Theory, Relations, and Functions
  - Graph Theory
- Capturing and Modeling of Requirements
- Normative, rationale, participative, and heuristic methodologies
- Functional, physical, and operational Architectures
- Interfaces, Integration, and Composition of Systems
- Frameworks and Standards
  - System Modeling Language (SysML)
  - Object-Process Methodology (OPM)
  - The Open Group Architecture Framework (TOGAF).
- Department of Defense Architecture and CORE 5.0
  - Overview
  - Operational, System, and Technical Views

- Virtual System Challenges
- System-of-System Modeling Challenges

Where feasible, guest speakers will talk about practical applications and experiences.

## Objectives

The student will be exposed to the fundamental methods and techniques for system modeling and architecting. He will be introduced to supporting frameworks and standards and learn about their strengths and shortcomings. At the end of the course the student should understand which methods and techniques can be used to support modeling and architecture of complex system, virtual systems, and system-of-systems.

## Text and Class Material

For the introduction and theoretic sections, the following textbook is mandated:

- Dennis M Buedde (2000) The Engineering Design of Systems, Models and Methods. Wiley Series in Systems Engineering, John Wiley and Sons, Inc.

Additional reading assignments will be distributed during classes where necessary.

For the practical examples, the academic version of CORE 5.0 of Vitech Corporation is necessary. It will be addressed in class how to obtain and install this software.

Access to Blackboard (<http://blackboard.odu.edu>) is mandatory. Additional course materials, handouts, slides, etc. will be available via Blackboard.

## Examinations, Homework Assignments, Projects

- An in class interim examination (closed book, closed notes) will be conducted October 16, 2007
- Each student will contribute to a class project using the CORE 5.0 software for an architecting assignment
- The final examination is a take home examination that will be distributed on November 27, 2007 and that needs to be finalized by December 11, 2007

## Academic Calendar Fall 2007

25 August	Classes begin
31 August	Last day to DROP a course with no grade assigned
	Last day to DROP and receive full tuition refund or credit
4 September	Last day to ADD a course
7 September	Last day to withdraw and receive half-tuition refund or credit
6-9 October	Fall Break
7 December	Classes end
8-14 December	Examination
15 December	Fall Commencement

