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**Appendix**

# Introduction to Software Engineering

**AERSP 440**  
**Spring Semester, 2009**

**Prof. Lyle N. Long**

**1:25 - 2:15 PM, Mon., Wed., and Fri.**  
**160 Willard Building**

**Links**

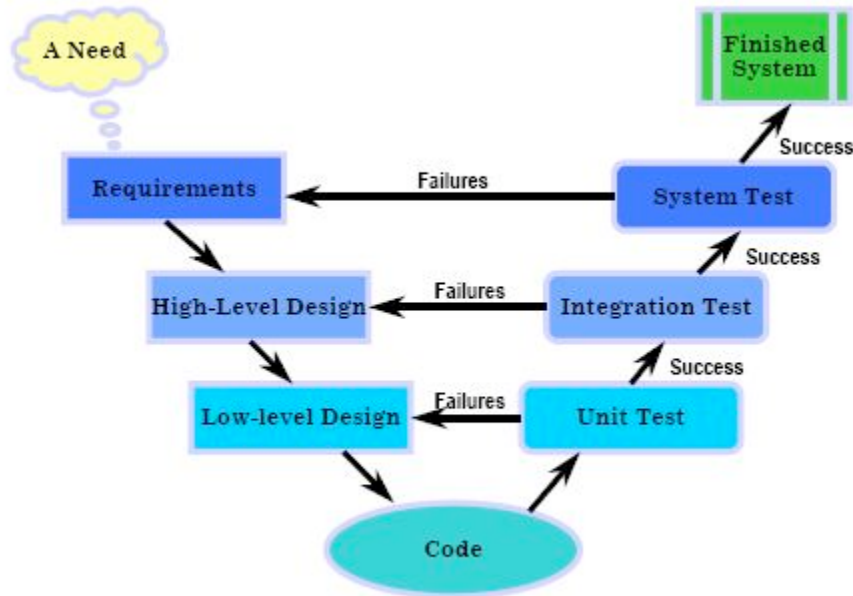
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## LECTURE MATERIAL FOR COURSE

Note: The detailed course notes are only available to students in the course and are copyrighted.

### • Roadmap of Course:



### • Background Information (1 Lecture)

- [First Day Info](#)
- [Syllabus](#)
- [Webpage for Author of Textbook](#) (Ian Sommerville)
- [Computational Science Graduate Minor](#)
- [Information Science and Technology Undergraduate Minor for Aerospace Engineers](#)
- Read:
  - [The Five Pillars of Aerospace Engineering](#), by L. N. Long
  - [CrossTalk Journal paper](#), by L. N. Long
  - [The Role of Software in Spacecraft Accidents](#), By N. Leveson
  - Feb. 2007 F-22 software problem: [Associated Press](#) and [CNN](#)
- More info:
  - [AIAA Software Systems Technical Committee](#)
  - [All AIAA Technical Committees](#)
  - [Workshop on High Confidence Aerospace Software \(2006\)](#)
  - [IEEE Computer Society SE Portal](#)

- [Penn State Great Valley, Software Engineering Graduate Program](#)
  - [Carnegie-Mellon \(SWE Institute\)](#)
  - [Important Computing Subjects and Skills](#), by S. Surakka
  - [Paper describing MIT SWE Course](#), by K. Lundqvist and J. Srinivasan
  - [Current Status of SWE Degree Programs](#), by D. J. Bagert and X. Mu
  - [Software and Higher Education](#), by J. C. Knight and N. G. Leveson
- **Project** (? Lectures)
    - [Project Description](#)
    - [Dates](#)
  - **Introduction** (7 Lectures)
    - [Motivation and Overview of Software Engineering](#)
    - [Introduction to Software Engineering \(Chap. 1\)](#)
    - [Socio-Technical Systems \(Chap. 2\)](#)
    - [Critical Systems \(Chap. 3\)](#)
    - [Software Processes \(Chap. 4\)](#)
    - [Project management \(Chap. 5\)](#)
    - [Facts and Fallacies](#) book by R. L. Glass
    - [Interesting Videos](#)
    - Read:
      - Chap. 1-5 of Sommerville Textbook
      - [Chap. 1 of SWEBOOK](#)
    - Additional Material:
      - [Software Engineering Certification](#)
      - [The Mythical Man Month](#) by Fred Brooks
      - [Integrating "Crisis" into Project Management Training](#), CrossTalk Journal, Feb., 2000
      - [USAF OPERATIONAL RISK MANAGEMENT](#)
  - **Requirements** ( 4 Lectures?)
    - [Concept of Operations \(CONOPS\)](#)
    - [Software Requirements](#)
    - [Requirements Engineering Processes](#)
    - [System Models](#)
    - [Critical Systems Specification](#)
    - [Formal Specification](#)
      - Formal Methods (if we have time)
    - Read:
      - Chap. 6-10 of Sommerville Textbook
      - [Major Causes of Software Failures](#), CrossTalk Journal, July, 1998
      - Chap. 1 and Sect. 2.1 of: [A Gentle Introduction to Software Engineering](#), " USAF
      - [Chap. 2 of SWEBOOK](#)
      - IEEE Standard 830-1998 (on reserve in Engineering Library)
  - **Midterm #1** , Feb. 25, in class (1 period)

- Min: 49, Max: 99, Average: 81, ([image](#))
- Covers Chap. 1-10, all notes, lectures, homework, and all reading assignments
- **Design** ( 5 Lectures? )
  - [Architectural Design](#)
  - [Distributed Systems](#)
  - Application Architectures (will probably skip this, Chap. 13)
  - [Object Oriented Design](#) (read also: [UML slides](#))
  - [Real-time System Design](#)
  - [User Interface Design](#)
  - Read:
    - Chap. 11-12 and 14-16 of Sommerville Textbook
    - Sect. 2.3 of: [A Gentle Introduction to Software Engineering](#), " USAF
    - [Article on CORBA](#)
- **Spring Break, Mar. 9 - 13, 2009**
- **Code Development**
  - Notes from Sommerville book: ( 3 Lectures? )
    - [Rapid Software Development \(Chap. 17\)](#)
    - [Software ReUse \(Chap. 18\)](#)
    - Component-Based Software (Chap. 19), we will skip this chapter
    - [Critical Systems Development \(Chap. 20\)](#)
    - [Software Evolution \(Chap. 21\)](#)
  - Languages ( 5 Lectures? )
    - [Ada Lectures by Dr. Dewar](#)
    - [Ada Intro Slides \( more info on Ada \)](#)
    - [Object Oriented Programming \(OOP\)](#)
    - [Example OOP Java Code \( Images Required \)](#)
    - [FORTRAN](#)
    - [Writing the Programs](#) (from Pfleeger and Atlee)
    - [Unified Modeling Language \(UML\) \( More info \)](#)
  - Read:
    - Chap. 17, 18, 20, and 21 of Sommerville Textbook
    - Sect. 2.4 of: [A Gentle Introduction to Software Engineering](#), " USAF
    - Pages 41-61 (Guidelines for Choosing a Computer Language) [A Gentle Introduction to Software Engineering](#), " USAF
    - Appendices E thru L of [A Gentle Introduction to Software Engineering](#), " USAF
- **Ronald Kohl** , Software Engineering Institute, [Top 10 Things I Wish I'd Learned in School](#), Mar. 16.
  - See also: [AIAA COTS Guidebook](#)
- **Verification and Validation** ( 2 Lectures? )
  - [Verification and Validation](#)
  - [Software Testing](#)

- Read:
  - Chap. 22 & 23 of Sommerville Textbook
  - Sect. 2.5 of: [A Gentle Introduction to Software Engineering](#), " USAF
- **Management** ( 2 Lectures? )
  - [Managing People](#)
  - [Software Cost Estimation](#)
  - Read:
    - Chap. 25 and 26 of Sommerville Textbook
    - [Crosstalk article on cost estimates](#), May, 2007
- **Midterm #2** , Apr. 10, in class (1 period)  
Covers ALL material after Midterm #1 thru Apr. 8  
(closed book and notes)
- **Software Standards** ( 3 Lectures? )
  - IEEE
    - [IEEE Software Standards](#)
    - [IEEE Software Standards Site](#)
  - DO-178B
    - [Introduction](#)
    - I will discuss DO-178B in class but cannot give out copies of it
    - [FAA Circular AC20-115B](#)
    - [FAA Order No. 8110.49](#)
    - [Intro to DO-178B](#)
    - [DO-178B on Wikipedia](#)
    - [Paper on DO-178B](#) by L. A. Johnson
    - [How to Obtain DO-178B](#) ( [RTCA main website](#) )
    - [Courses on DO-178B](#)
  - [FAA](#)
    - [Type Certificates \(TC\)](#)
    - [Supplemental Type Certificate \(STC\)](#)
    - [Technical Standard Orders \(TSO\)](#)
  - [AIAA](#)
    - [The Risks of Using COTS Products in Mission Critical Systems \(i.e. the COTS Guidebook\)](#)
    - [Other AIAA standards](#)
- [Register for CSDA exam by June 27, 2009 !!](#)
- [Conclusions](#)
- [Appendix](#)

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**Maintained by: [Prof. L. N. Long, 233 Hammond Bldg.](#)  
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