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| **SYS501 – Concepts of Systems Engineering** | | | | | | | | | |
| **Online – Winter 2011** | | | | | | | | | |
| **Instructor: Scott Doremus** | | | | | | | | | |
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| **Course Description** | | | | | | | | | |
| Systems engineering is a fast growing field of study that has gotten a fair amount of attention in recent years primarily due to the unprecedented growth in systems complexity. The need for talented systems engineers is critical in order to keep pace with the highly dynamic and risky projects that are undertaken daily.  This course is intended to give you the fundamental knowledge and theory associated with industry best practices in the field of systems engineering. The course covers both federal acquisition and commercial product development. You will learn the basic concepts of complex systems, system of systems and the applicable processes, tools and techniques associated with systems engineering in the modern world.  *Given that this is an online version of the course, interactive activities and tool demonstrations will be leveraged to the greatest extent to possible in order to maximize learning value and real-world application.* | | | | | | | | | |
| **Course Objectives** | | | | | | | | | |
| By the end of this course you should be able to:   1. Understand systems engineering in the modern world of systems. 2. Understand the system development processes – both federal and commercial. 3. Understand the various tools available to the systems engineer for reducing risk. 4. Become familiar with several software packages used for reducing risk. 5. Develop the ability to apply quantitative analysis and decision-making techniques to take your own work/company. | | | | | | | | | |
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| **Course Materials** | | | | | | | | | |
| 1. Systems Engineering Principles and Practices   Alexander Kossiakoff and William Sweet  John Wiley & Sons Publishing  ISBN 0-471-23443-5   1. MyWPI Course Website: consult for announcements and use of the website.   Optional Reading   1. INCOSE Systems Engineering Handbook, version 3.1 (highly recommended!) 2. Sage and Armstrong, *Introduction to Systems Engineering*, Wiley-Interscience, 2000 3. Blanchard and Fabrycky, *Systems Engineering and Analysis*, Third Edition, Prentice Hall, 1998 4. Sage and Rouse (editors), *Handbook of Systems Engineering and Management,* John Wiley and Sons, 1999 | | | | | | | | | |
| **Basis for Course Evaluation** | | | | | | | | | |
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| Quality more important than quantity! | | | | | | | | | |
| Homework (7 assignments + 2 special problems) | | | | | 25% | | | | |
| Participation in online discussion and exercises | | | | | 10% | | | | |
| Paper 1 | | | | | 20% | | | | |
| Paper 2 | | | | | 20% | | | | |
| Capstone Report (written) | | | | | 25% | | | | |
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| **Course Schedule** | | | | | | | | | |

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| Week | Date | Lecture Topic | Chapter(s) to Read by This Date | Homework |
| 1 | 10-Jan | Systems Engineering and the World of Modern Systems (Chapter 1) Structure of Complex Systems (Chapter 2) |  |  |
| 2 | 17-Jan | Systems Engineering and the World of Modern Systems - cont. The System Development Process (Chapter 3) | 1, 2, 3 | Probs 1.1, 1.2, 2.2 |
| 3 | 24-Jan | Needs Analysis (Chapter 5) *Requirements* Class Exercise 1 | 5 | Probs 3.3, 3.5 and Special Problem 1 |
| 4 | 31-Jan | Risk Management (Section 4.4) Functional Analysis (Section 5.3) Concept Exploration (Chapter 6) | 6 | Probs 5.2, 5.4, 5.6 |
| 5 | 7-Feb | Concept Definition (Chapter 7) Tradeoff Analysis (Chapter 14, Section 4) *Architecture* | 7, 14 | Probs 6.1, 6.5 and Paper 1 |
| 6 | 14-Feb | Advanced Development (Chapter 8) Engineering Design (Chapter 9) Integration and Evaluation (Chapter 10) | 8, 9, 10 | Probs 7.1, 7.2 and Special Problem 2 |
| 7 | 21-Feb | Production (Chapter 11) Operation and Support (Chapter 12) Class Exercise 2 | 11, 12 | Probs. 8.2, 9.1, 9.2, and 10.6 |
| 8 | 28-Feb | Systems Engineering Management (Chapter 4) *The "ilities"* | 4 | Paper 2 and Special Problem 3 |
| 9 | 7-Mar | Software Systems Engineering (Chapter 13) | 13 |  |
| 10 | 14-Apr | Modeling and Simulation (Chapter 4, Sections 1-3) |  | Capstone Report |
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