SE510 Systems Engineering

Course Objective:
Systems Engineering (SE) is a structured approach to developing interdisciplinary and complex products. This course will introduce SE methodologies spanning the product development lifecycle from initial scope definition through delivery of the prototype or first production article. SE techniques are used to define and manage requirements, analyze and optimize product architectures, develop comprehensive designs, plan and supervise manufacturing, test and evaluation, and implement the production line. SE also provides techniques for ensuring that system-level requirements (i.e., reliability, maintainability, safety, etc.) are incorporated into the final product. Spanning all these activities are a set of SE analysis and control functions that continuously assess and manage the product scope, quality, configuration, interfaces and performance.

This course is a core requirement for the Systems Engineering focus in the IPFW Master of Science in Engineering degree.

Credits: 3
Professor: Dr. Steve Walter
Homework: Homework will be assigned weekly.
Evaluation: 30% Homework
            30% Midterm Exam
            40 % Final Exam
Final Grades: This semester Purdue and IPFW approved the option of using a plus/minus course grading scale. It is up to each faculty member to determined whether they will adopt +/- grades. SE 510 will not report plus and minus grading increments.

Tentative Class Schedule

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<th>Topic</th>
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<td>1</td>
<td>Systems and Systems Engineering Overview / Product Lifecycle</td>
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<td>Concept Development and System Scope</td>
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<td>Requirements and Specifications</td>
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<td>Functional Analysis and Allocation</td>
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<td>Design Synthesis</td>
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<td>System Architecture / Exam 1</td>
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<td>Configuration Management</td>
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<td>Specialty Engineering, the “ilities” and Human Factors Engineering 1</td>
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<td>Verification and Validation 2 and Planning</td>
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<td>System Engineering Processes and Standards</td>
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<td>14</td>
<td>Ethics / Putting it together: The B-2 Case Study</td>
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<td>Final Exam</td>
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Course Outcomes:
A student who successfully completes the course will have demonstrated:
1. An understanding of Systems Engineering processes and standards.
2. Familiarity with the project and product lifecycle.
3. An ability to define scope with a work breakdown structure.
4. The capability to write requirements and specifications.
5. Techniques for performing functional analysis.
6. An ability to generate comprehensive Interface Control Documents (ICDs)
7. The ability to develop and perform system trades.
8. The ability to construct and analyze a system architecture.
10. An understanding about how to design systems that are easy to manufacture and maintain and safe.
11. Knowledge of techniques for verifying a design and validating a product.
12. An understanding of the types of plans needed in engineering a complex system.

Books:
Readings will be assigned from a number of sources including:

Textbook

1. **TBD**

Material available on-line or from the professor


12. *Integration Definition For Function Modeling (IDEF0)*, Draft Federal Information Processing Standards Publication 183, 1993 December 21

13. *B-2 Systems Engineering Case Study*, John M. Griffin, James Kinnu and John, M. Colombi, Center for Systems Engineering, AFIT, Wright Patterson AFB, OG

The instructor will make the free documents available to the students via the eLearning website.