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| **ELEN 2040 – Engineering Systems**  **Class Schedule**: 3 Credit course, meeting the equivalent of 3 50 minute class periods per week.  **Course Coordinator:** Susan C. Schneider |

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| **Course Materials** | |
| **Required**: | Carlos A. Smith and Scott Campbell, A First Course in Differential Equations, Modeling and Simulation, 2nd ed, CRC Press/Taylor & Francis 2016  MatLab, Simulink (available for installation on student laptops and also available on College of Engineering laboratory computers) |

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| **Course Description**: | | | | |
| Focuses on the modeling and solution of physical systems including translational and rotational mechanical systems, mass balance systems (fluids, chemical), thermal systems and electrical systems. Analytic solution techniques stress the universality of the mathematics for all systems. Computer solutions using MatLab and Simulink are used to further investigate the linear system behavior and to introduce non-linear system behavior. | | | | |
| **Prerequisites:** EECE 2010 (EECE 011) and MATH 2450 (MATH 082) | | | | |
| **Required**  **Contribution to Professional Component:** Engineering Science 100% | | | |  |
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| **Course Goals:** | | | | |
| * Introduce the terminology associated with simple mechanical, thermal, fluid, and electrical systems. * Learn to identify and use the appropriate solution technique to use to solve the system equations. * Learn to verify (check) numerical solutions to complicated systems by predicting appropriate limiting behaviors from knowledge of the behavior of simpler systems. | | | | |
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| **Course Objectives:** | | | | |
| *By the end of this course you should be able to …* | | | | |
| 1. Define what is meant by an engineering system. 2. Draw the free-body diagram of simple systems. 3. Derive the appropriate model equations (linear or differential equations) for simple translational and rotational mechanical systems, fluid systems, chemical systems, and thermal systems. 4. Apply the appropriate solution technique to solve system equations to predict the time or frequency response of the system. 5. Use MatLab to check linear system solutions including graphical presentation of results. | | | | |
| **Contribution to Program Outcomes** | | *Partial fulfillment of ABET Criterion 3 outcomes*  A, E, K | | | |
| **Course Topics** | | | **In Text** | |
| 1. Introduction 2. Antidifferentiation, Separation of Variables, and PFE 3. Mass balance systems (fluids) 4. Thermal systems 5. Mechanical systems – translational 6. Mechanical systems – rotational 7. Electro-mechanical systems 8. Chaotic systems (time allowing) | | | Chapter 1  Chapter 2  Chapter 8 (\*)  Chapter 9 (\*)  Chapter 6 (\*)  Chapter 7 (\*)  Instructor notes  Instructor notes  (\*) = includes relevant sections of chapters 2 through 5 | |
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