1. ES202 Principles of Systems Engineering (Required Course)

2. Credits (2 2 3), 2 lecture periods, 2 lab periods, 3 credits hours

3. Course coordinator: R. Broussard, Associate Professor

4. Textbook: A custom textbook has been generated for this course: Programming for Systems Engineers, a Primis eBook. Contents are from:
    a. D'Orazio and Tan, C Programming for Engineering and Computer Science ISBN-13: 978-0079136787
    b. Palm, A Concise Introduction to MATLAB ISBN-13: 978-0073385839 or 978-0071263726
    c. Faculty generated slides

5. Specific course information
    a. This second course in systems engineering introduces concepts from control theory, instrumentation, and mechatronics, offering students a practical, hands-on introduction to these topics through the use of projects and laboratory exercises. This course provides a basic toolset for mathematical analysis (linear algebra, transfer functions) as well as hardware skills needed for prototyping
    b. Prerequisites: ES201 or approval of department chair
    c. This is a required course in the major.

6. Specific goals for the course
    a. Manipulate matrices to solve a variety of problems
    b. Develop and understand transfer functions for dynamic systems
    c. Use MATLAB to solve a variety of mathematical problems
    d. Use SIMULINK to simulate dynamic systems
    e. Use multimeters, protoboards and oscilloscopes to analyze electrical circuits
    f. Develop transfer functions for simple RLC circuits
    g. Select appropriate op-amp circuits to build differential equations
    h. Select and implement appropriate power supplies for electronic systems
    i. Grasp the basics of feedback control and its significance in the modern engineering environment.
    j. a, b above contribute to ABET outcomes a and e (Design system, component, or process)
    k. c, d, e above contribute to ABET outcomes b and k (Apply modern engineering tools)
    l. a, f, g, h, i above contribute to ABET outcomes a and e (Identifying, formulating, and solving engineering problems)
    m. ABET outcomes f, h, and j are measured in this 200 level course, a 300 level course and a 400 level course to measure progression. (have knowledge of contemporary issues, an understanding of professional and ethical responsibilities, and understand the impact of engineering solutions in a global and societal context).

7. Brief list of topics to be covered

Lecture Topics	Lecture sessions
1. Feedback control concepts	2
2. A/D conversion	1
3. Linear algebra	5
4. Transfer functions	5
5. Basic circuits	2
6. Op-amp configurations	2
7. Batteries and power supplies	2
8. Review and practice	3
Lab Topics	Laboratory sessions

1. Telemetry between C and MATLAB	1
2. Elevator control project	4
3. SIMULINK	2
4. Dynamic system simulation project	2
5. Intro to lab equipment	1
6. Basic circuit analysis	1
7. Op-amps	1
8. Batteries and power supply regulation	1
9. Circuit-based analog feedback control project	3