Template for ABET course syllabi (new format)

1. *Course number and name*
   ENGR 415 –Mechatronics

2. *Credits and contact hours*
   3 Credit Hours , 3 hours of lecture per week.

3. *Instructor's or course coordinator's name*
   Instructor: .V.Krishnan, Professor of Mechanical Engineering
   Course coordinator: .V.Krishnan, Professor of Mechanical Engineering

4. *Text book, title, author, and year*
   Introductions to Mechatronics and Measurement Systems 3rd Editions, by David G. Alcaitore and Michael B. Histand, McGraw Hill, 2007. (ISBN 0-07-296305-0)

   a. *other supplemental materials*
      - Richard H. Barnett, Sarah A. Cox, Larry D.O'Cull, Embedded C Programming and the Atmel AVR, Thomson Delmar Learning, 1st edition 2002
      - Richard C. Dorf and Robert H. Bishop, Modern Control Systems, 10th edition. Pearson Prentice Hall 2005, ISBN 0-13-145733-0.

   (Optional References).

5. *Specific course information*
   a. *brief description of the content of the course (catalog description)*
      Introduction to Mechatronics systems, sensors and actuators. Basics of a multidisciplinary field that combines electronics, mechanical design and simulation, and control systems. Simulation and design of systems with sensors, controllers and actuators. System elements including common sensors, actuators and various electronic controllers.

   b. *prerequisites or co-requisites*
      ENGR 201 or 204; ENGR 305 with grade of C or better.

   c. *indicate whether a required, elective, or selected elective course in the program*
      Elective for electrical and Mechanical Engineering.

6. *Specific goals for the course*
   a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.
      - The student will demonstrate knowledge of common sensor types.
      - The student will be able to design simple amplification and filtering circuits.
      - The student will demonstrate a knowledge of common actuators.
      - Student will be able to use mathematical models for DC motors.
      - Students will be able to design simple linkage and gearing for actuation.
      - The student will demonstrate a knowledge of popular controller types.
      - The student will be able to integrate an Atmel microcontroller into a mechatronic design.

- The student will be able to write a C program for Atmel microcontrollers.
- The student will be able to write a ladder logic program for a PLC and understand how to integrate a PLC into a mechatronic system.
- The student will be able to numerically simulate a system from its defining differential equations.
- The students will design and simulate a mechatronic system using the components introduced in the class.

explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Course addresses ABET Student Outcome(s): a, c , d, e ,k, i.

7. *Brief list of topics to be covered*

- Basic Electric Circuits and Components Review
- System Response
- Data acquisition and control software (LabVIEW)
- Digital data acquisition (A/D, speed, resolution, quantization errors, aliasing, reconstruction,
- etc.)
- Microprocessor Programming and Interfacing
- Actuators
- Sensors
- Mechantronic Systems – Control Architectures and Case Studies