MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 405 Mechatronics (4 Units) Required for Mechatronics Concentration, Elective for all others

Course Description: (2019-2020 Catalog)	Microprocessor applications in machine control and product design. Applied electronics. Drive technology; transducers and electromechanical systems. Real-time programming. Mechatronic design methodology. 3 lectures, 1 laboratory.
Prerequisite Courses:	EE 321, EE 361, ME 305 and ME 329 (ME329 may be taken concurrently), or CPE 316 or CPE/EE 329 and CPE/CSC 369 or CPE/EE 336.
Prerequisites by Topic:	• Basic electronics • Introduction to mechatronics or programming course applicable to embedded systems • Introduction to machine design (may be taken concurrently)
Textbook: (and/or other required material)	Various handouts and laboratory materials provided on course Moodle page
References:	Horowitz and Hill, *The Art of Electronics,* Cambridge U. Press, 1989 Cook, *Robot Building for Beginners* and *Advanced Robot Building,* Apress, 2004 Data sheets of electronic component manufacturers and RTOS software
Course Coordinator/Instructor:	John Ridgely, Professor of Mechanical Engineering
Course Learning Outcomes:	1. The student can select problems for which mechatronics offers a good solution 2. The student is able to perform high level design of a mechatronic system 3. The student can design a complex program using an organized design methodology 4. The student can analyze real-time constraints and design software to meet them 5. The student is skilled at writing and debugging program code 6. The student documents designs of hardware and software thoroughly and accurately 7. The student recognizes and designs solutions for safety issues related to mechatronics 8. The student works effectively as a member of a development team

9. The student can efficiently find design information through research

Relationship of Course to Mechanical Engineering Student Outcomes:

SO 1: Mastered (M)
SO 2: Mastered (M)
SO 3: Mastered (M)
SO 4:
SO 5: Developed (D)
SO 6:
SO 7: Mastered (M)

Topics Covered:

1. The role of computing in "smart" product design
2. The task-state-transition software design technique
3. Programming in C++, including object-oriented modular software design
4. The operation and use of a real-time operating system
5. Techniques for effective testing and debugging of systems
6. The generation of hardware and software documentation
7. The use of networking in embedded systems

Laboratory Projects:

1. Introduction to programming tools and modular software design through development and testing of a device driver
2. Miscellaneous small exercises in using software tools; these exercises are updated each quarter
3. Term project – an open-ended design project which is changed each quarter

Class/Lab Schedule: Three 50-minute lectures per week, one 170-minute lab per week

Contribution of Course to Meeting the Professional Component:

(a) College-level mathematics and basic sciences:	0 credits
(b) Engineering Topics:	4 credits
Design?	Yes
(c) General Education:	0 credits
(d) Other:	0 credits

Prepared by: John Ridgely **Date:** 07/04/2020