

**Wheeling Jesuit University  
Department of Engineering  
Mechatronics**

**ENGR 352-01**

**Spring 2019**

**Instructor:** Dr. Peter Ehni

**Office:** D-111B x-2433

**Office hours:** 12-1 M,W,F; and by appointment any time

**Text:** Suggested: Introduction to Mechatronic Design by Carryer, Ohline, and Kenny, Prentice Hall/Pearson 2011.

**Catalog Description:**

Integration of electronics, mechanical engineering and computer science with intelligent computer control in designing and manufacturing machines, products and processes. Topics include: semiconductor electronics, analog signal processing, op amps, digital circuits, Boolean algebra, logic network designs, Karnaugh maps, flip-flops and applications, data acquisition, A/D and D/A, interfacing to personal computers, sensors and actuators, microcontroller programming and interfacing. Prerequisite ENGR 244 and ENGR 312.

**Goals and objectives:**

Mechatronics is the blending of Electronics, Mechanical components, and Microcontrollers. We will learn about microcontrollers and how to program them. We will increase our understanding of electronics by learning about sensors, signal conditioning, digital circuits, noise, grounding and isolation of circuits. We will learn about actuators, including: Brushed DC motors, Brushless DC motors, Stepper motors, Solenoids, Pneumatic and Hydraulic systems. We will study closed-loop control of actuators. The class will culminate in a final project.

**Grading:**

There will be three equally weighted exams, including the final. The exams will be worth 1/3 of your grade. Homework problems and labs will be worth 1/3 of the grade. The final projects will be worth a third of the grade.

**Other Things:**

The official school policy for attendance will be in effect: 8 cuts total for the semester. Since we meet for 3 hours in a combined lecture/lab, missing one day counts as 2 cuts.

Cheating, during any event for which grades are assigned, will warrant immediate separation from the course. Copying homework solutions is cheating. Working together on homework is not cheating and is encouraged.

**Expected Learning Outcomes:**

Upon successful completion of this course, you are expected to know the following knowledge and skills:

1. Be able to collect data from a variety of sensors, including temperature, position, force, and light sensors. (M)
2. Know which motor is appropriate for a given situation. (M)
3. Know how to properly connect various motors to a microcontroller. (M)
4. Be able to program a microcontroller to collect data from a sensor, process the data and then control an actuator. (H)
5. Understand basic closed-loop control of a system. (M)

For ABET Criterion 3: Student Outcomes; the following outcomes are emphasized in the course:

1. An ability to identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

**Last Date to Drop the Course:**

March 26, 2019

**Disability Statement:**

Wheeling Jesuit University offers students with documented disabilities individual accommodations on a case-by case basis with confidentiality in compliance with the American with Disabilities Act and Section 504 of the rehabilitation Act of 1973.

Ultimately, all students are responsible for their own academic achievement. They must attend classes, complete course assignments, and fulfill all university requirements for their chosen field of study. It is up to students with disabilities to seek out available assistance on campus and to utilize individualized accommodations.

In order to receive accommodations under Section 504 and ADA, students with disabilities must self-identify to the university, provide current (within three years) and comprehensive documentation concerning the nature and extent of the disability, and communicate their needs to the Disability Services Director in Ignatius Hall room G24 call 304-243-4484 before each semester begins.

**Academic Integrity Statement:**

Students are advised that WJU's Academic Integrity Policy will strictly be enforced in this course (see <https://www.wju.edu/studentlife/pdf/studenthandbook.pdf>). Questions regarding the policy may be directed to the Office of the Academic Vice-President.

Cheating, during any event for which grades are assigned, will warrant immediate separation from the course and a grade of F will be recorded for the course. If I see your cell phone anywhere near you during a test, whether it is turned on or not, I must assume you are cheating (see above sentence on cheating).

Cell phones should be turned off during class. If you just can't make it through class without texting then please leave class to get your fix and consider seeing the school counselor for help with your addiction.

**Official E-mail:**

An official WJU e-mail is established for each registered student, each faculty member, and each staff member. All university communications sent via e-mail will be sent to this WJU e-mail address.

**Academic Resource Center:**

The Academic Resource Center (ARC) is a totally free academic-support service available to all enrolled Wheeling Jesuit University students and staffed almost exclusively by WJU students recommended for employment by WJU faculty. The ARC is located in Bishop Hodges Library and is open five days a week:

Sundays 6:00-8:00 p.m.  
Mondays-Thursdays 1:00-9:00 p.m.

Please visit the ARC's website (readily accessible on the Cardinal homepage under "Quick Links" or as the first listing under "Student Services") to learn about the ARC's services (emphasizing writing, math, and the sciences) and to schedule appointments.

**Title IX Statement:**

Wheeling Jesuit University seeks to provide an environment that is free of bias, discrimination, and harassment. If you have been the victim of sexual harassment, misconduct, or assault we encourage you to report this. If you report this to a faculty member, she or he must notify our college's Title IX coordinator about the basic facts of the incident (you may choose whether you or anyone involved is identified by name). For more information about your options at WJU, please go to <http://wju.edu/titleix/>.