

## MTRE 1000 / 001 – Introduction to Mechatronics Engineering – Fall 2013

**Instructor:** Kevin McFall, PhD

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**Office Hours:** 11:00-12:00 MWF, 1:00-2:00 TR, or by appointment

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**Location:** Q 106 (robotics project in Q 118)

**Meeting times:** TH 11:00-11:50 am

**Pre-requisites:** none

**Textbook:** Oakes, Leone, Gunn, *Engineering Your Future: A Brief Introduction to Engineering*, 4<sup>th</sup> edition, Oxford University Press, 2012.

**Course Catalog Description:** An introduction to career opportunities in Mechatronics Engineering; familiarization with college and departmental policies, curriculum, and facilities.

### Learning Outcomes:

- Appreciate the fundamental components that make up mechatronics engineering systems.
- Develop the capacity to think creatively and independently about new design problems.
- Undertake independent research and analysis and think creatively about engineering problem solving.

### Topics Covered Include:

- The engineering profession, education in engineering, and introduction to design.
- Engineering solutions and representation of technical information.
- Engineering measurements, estimates, dimensions, units and conversions
- Engineering economics
- Statistics
- Statics, strength of materials, and material balance.
- Energy sources and alternatives.
- Fundamental energy principles.
- Electrical theory

### Academic Misconduct

At SPSU, academic misconduct is defined as “any act that could have resulted in unearned advantage or that interferes with the appropriate academic progress of others”. All acts of academic misconduct will be reported to the Honor Council. For more information see [www.spsu.edu/honorcode](http://www.spsu.edu/honorcode). The easiest way to avoid academic misconduct issues is to always do your own work; it’s as simple as that.

### Disability Statement

If you have a documented disability as described by the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) that may require you to need assistance attaining accessibility to instructional content to meet course requirements, please contact the ATTIC at 678-915-7361 as soon as possible. It is then your

responsibility to contact and meet with the instructor. The ATTIC can assist you and the instructor in formulating a reasonable accommodation plan and provide support for your disability. Course requirements will not be waived but accommodations will be made, when appropriate, to assist you to meet the requirements.

### **Communication**

Course material will be disseminated in D2L including lecture notes and recordings, homework solutions, old tests, etc. All official course announcements, including instructions when class may be cancelled, will be posted in the D2L course news. Be sure to check D2L regularly. Do **not** use the internal email system in D2L. The instructor will only respond to email sent to [kmcfall@spsu.edu](mailto:kmcfall@spsu.edu).

### **Grading scale**

A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

### **Attendance (10 points)**

Typically, attendance is not taken in my classes. College is supposed to be filled with adults acting like adults. However, to get you in the habit of acting responsibly, 10 points of the final grade will be based on attendance. In general, late assignments are not accepted. Extenuating circumstances can result in exceptions to this rule, but agreement must be reached with the instructor in advance of the assignment or class that will be missed.

### **Graded assignments (60 points)**

Eleven graded assignments are weighted equally. The due dates and topics are:

- Aug 20: Pre-test
- Sep. 17: Energy exercise
- Sep. 24: Personalized curriculum flowchart
- Oct. 01: Interview of an engineer
- Oct. 08: Statics exercise
- Oct. 15: Visit student organization meeting
- Oct. 22: Strength of materials exercise
- Nov. 05: Circuits exercise
- Nov. 12: Literature review exercise
- Nov. 19: Statistics exercise
- Nov. 26: Engineering economics exercise

### Project grades (30 points)

The term project is a mechatronics design competition using VEX robotic systems. The

- Sketches of multiple concepts generated during concept generation due 09/12/2013 (10 points)
- Decision table for identifying two viable concepts due 9/17/2013 (10 points)
- Building of the Squarebot 2.0 as practice due 10/03/2013 (10 points)
- Building of two prototypes consistent with selected concepts due 10/24/2013 (20 points)
- A final working robot with the functionality of the best prototype due 11/07/2013 (10 points)
- Detailed sketch of the best prototype due 11/14/2013 (10 points)
- Qualifying round score (10 points)
- Preliminary round score (10 points)
- Final round score (10 points)

### Course schedule

Week	Tuesday		Thursday	
	Topic	Read	Topic	Read
Aug 15			Introduction	
Aug 20, 22	Surviving coursework	Ch. 5	Project introduction	Ch. 8
Aug 27, 29	Units	Ch. 6	Design process	Ch. 9
Sep 03, 05	Energy		Concept generation	
Sep 10, 12	Engineering majors	Ch. 1-2	Concept selection	
Sep 17, 19	Engineering job functions	Ch. 3	Disassemble old bots	
Sep 24, 26	Statics		Collect bot inventory	
Oct 01, 03	Communication skills	Ch. 10	VEX programming	
Oct 8, 10	Strength of materials		Bot build phase	
Oct 15, 17	Software tools	Ch. 7	Bot build phase	
Oct 22, 24	Circuits		Bot build phase	
Oct 29, 31	Work experience	Ch. 12	Bot build phase	
Nov 05, 07	Literature review		Prototype evaluation	
Nov 12, 14	Statistics		Bot qualification round	
Nov 19, 21	Engineering economics		Bot preliminary round	
Nov 26	Bot final round			