

## MTRE 1000 / 001 – Introduction to Mechatronics Engineering – Fall 2014

**Instructor:** Kevin McFall, PhD

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**Office Hours:** MTWRF 10:00 am – 11:00 am or by appointment

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

**Meeting times:** MW 11:00 am – 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. Purchasing the textbook is optional.

**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). Assignments may not be copied, not even in part, from any other source. The easiest way to avoid academic misconduct issues is to always do your own work; it’s as simple as that. If you work together in large groups be certain that you sit down separately to write your actual submission so that it will be written in your own words.

### **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, homework solutions, project descriptions, 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

### **Participation (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, 70% of these 10 points will be based on attendance. Late arrival to class (after your name has been called) results in a 75% attendance grade for the day. The other 30% of these 10 points is assigned by the lab technician for keeping the team workspace tidy. 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. Groups of up to 3 members may submit assignments together. Due dates for the following topics are marked in the course schedule.

- 1) Pre-test (see quiz on D2L)
- 2) Personalized curriculum flowchart (see drop box on D2L)
- 3) Energy exercise
- 4) Statics exercise
- 5) Interview of an engineer (see drop box on D2L)
- 6) Strength of materials exercise
- 7) Visit student organization meeting (see drop box on D2L)
- 8) Circuits exercise
- 9) Literature review exercise (see drop box on D2L)
- 10) Statistics exercise
- 11) Engineering economics exercise

### Project grades (30 points)

The term project is a mechatronics design competition using VEX robotic systems. The following items will count towards the project grade. Generally, the same grade will be shared by all team members although those found not contributing to the effort may receive reduced scores.

- a) Sketches of multiple concepts generated during concept generation (10 points) (see drop box on D2L)
- b) Decision table for identifying two viable concepts due (10 points) (see drop box on D2L)
- c) Building of the Squarebot 2.0 as practice (15 points)
- d) Building of two prototypes consistent with selected concepts (20 points)
- e) A final working robot with the functionality of the best prototype (15 points)
- f) Qualifying round score (15 points)
- g) Final round score (up to 10 points extra credit for top two teams)
- h) Detailed sketch of the final prototype (15 points) (see drop box on D2L)

### Course schedule

Week	Monday			Wednesday		
	Topic	Read	Due	Topic	Read	Due
Aug 11,13				Introduction		
Aug 18, 20	Coursework and curriculum	Ch. 5	1)*	Units	Ch. 6	
Aug 25, 27	Energy			Statics		2)*
Sep 01, 03				Majors, careers, teamwork		3)
Sep 08, 10	Strength of materials		4)	Software tools	Ch. 7	5)*
Sep 15, 17	Design process	Ch. 8	6)	Concept generation	Ch. 9	7)*
Sep 22, 24	Concept selection		a)*	VEX programming		b)*
Sep 29, Oct 01	Bot build phase		c)	Bot build phase		
Oct 06, 08	Bot build phase		d)	Bot build phase		
Oct 13, 15	Bot build phase			Bot build phase		
Oct 20, 22	Bot build phase			Prototype evaluation		e)
Oct 27, 29	Practice run			Bot grading round		f)
Nov 03, 05	Bot final round		g)	Circuits		h)*
Nov 10, 12	Literature review			Statistics		8)
Nov 17, 19	Engineering economics		9)*	Equipment return		10)
Nov 24, 26	Work experience	Ch. 12	11)			
Dec 01, 03	Wrap up					

\* Assignments marked in red with an asterisk are submitted on D2L (#1 as a quiz and the rest in dropboxes). Submissions placed in dropboxes need not be digitally produced, but must be legible, high-quality scans (i.e. not grainy images captured with smart phones).