

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

**Instructor:** Kevin McFall, PhD

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**Office Address:** Q 320

**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:** TR 5:00 pm – 5:50 pm

**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. Any instances of copying will be reported and documented on the involved students’ permanent record.

**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.

**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 4 members may submit assignments 5-10 together. Due dates for the following topics are marked in the course schedule.

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

### 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 rough prototypes consistent with selected concepts (20 points)
- e) Final mechanical design complete for the best prototype (15 points)
- f) Detailed sketch of the final prototype submitted as a JPG, DOC, or PDF file (15 points) (see drop box on D2L)
- g) Qualifying round score (15 points)
- h) Final round score (up to 10 points extra credit for top two teams)

### Course schedule

Week	Tuesday			Thursday		
	Topic	Read	Due	Topic	Read	Due
Jan 06, 08	Coursework and curriculum	Ch. 5		Majors, careers, teamwork	Ch. 2-3	1)*
Jan 13, 15	Dimensions and units	Ch. 6	2)*	Unit conversions		3)*
Jan 20, 22	Energy			Vectors		4)*
Jan 27, 29	Statics		5)	Elastic forces		
Feb 03, 05	Strength of materials		6)	Circuits		
Feb 10, 12	Software tools	Ch. 7	7)	Summations		8)
Feb 17, 19	Engineering economics			Statistics		
Feb 24, 26	z-transform		9)	Work experience	Ch. 12	
Mar 10, 12	Concept generation	Ch. 8	10)	Concept selection	Ch. 9	a)*
Mar 17, 19	Bot build phase		b)*	Bot build phase		c)
Mar 24, 26	Bot build phase			Bot build phase		
Mar 31, Apr 02	VEX sensors and actuators			VEX programming		d)
Apr 07, 09	Bot build phase			Bot build phase		11)*
Apr 14, 16	Mechanical design check		e)	Practice run		f)
Apr 21, 23	Bot grading round		g)	Bot final round		h)

\* 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).