

MTRE 1000 / 001 – Introduction to Mechatronics Engineering – Fall 2015

Instructor: Kevin McFall, PhD

Office Phone: 678-915-3004

Cell Phone: 610-573-6242

Office Address: Q 320

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

E-mail: kmcfall@kennesaw.edu

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*, 4th 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

Teams

Most assignments in this course will be completed in teams that will be assigned in the second week of classes. The intention of the teams is to create a close-knit study group. All assignments with calculations and the entire robot project will be completed in teams. All team members are expected to contribute equally to the teams. Students not pulling their weight will be given a warning once and thereafter will be assigned zero grades for subsequent assignments unless their activity level increases to an acceptable level.

Academic Misconduct

The Code of Academic Integrity at KSU states that

As a member of the Kennesaw State University community of scholars, I understand that my actions are not only a reflection on myself, but also a reflection on the University and the larger body of scholars of which it is a part. Acting unethically, no matter how minor the offense, will be detrimental to my academic progress and self-image. It will also adversely affect all students, faculty, staff, the reputation of this University, and the value of the degrees it awards. Whether on campus or online, I understand that it is not only my personal responsibility,

but also a duty to the entire KSU community that I act in a manner consistent with the highest level of academic integrity. Therefore, I promise that as a member of the Kennesaw State University community, I will not participate in any form of academic misconduct.

All acts of academic misconduct will be documented with the Student Academic Misconduct Incident form and included on the student's academic record. Assignments may not be copied, not even in part, from any other source without proper citation. If you work in groups larger than your team, be sure the team sits down separately from any others to write the solution in the team's own words.

Disability Statement

Any student who, because of a disabling condition, may require some special arrangements in order to meet the course requirements should contact the instructor as soon as possible to arrange the necessary accommodations. Students should present appropriate verification from KSU Student Disability Services. No requirement exists that accommodations be made prior to completion of this approved University process.

Communication

Course material will be disseminated in D2L including lecture notes, project and assignment 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 (individual assignment – see quiz on D2L)
- 2) Literature review exercise (individual assignment – see drop box on D2L)
- 3) Personalized curriculum flowchart (individual assignment – see drop box on D2L)
- 4) Interview of an engineer (individual assignment – 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 (individual assignment – 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 at least four concepts submitted as a single JPG, DOC, or PDF (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 (10 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) Presenting design to Martin Technology Academy¹ (10 points)
- g) Qualifying round score (15 points)
- h) Detailed sketch of the final prototype as a single JPG, DOC, or PDF file (10 points) (see drop box on D2L)

Course schedule

Week	Monday			Wednesday		
	Topic	Read	Due	Topic	Read	Due
Aug 17, 19	Coursework and curriculum	Ch. 5		Majors, careers, teamwork	Ch. 2,3,12	1)*
Aug 24, 26	Dimensions and units	Ch. 6	2)*	Unit conversions		3)*
Aug 31, Sep 02	Energy			Vectors		4)*
Sep 07, 09	No class			Statics		5)
Sep 14, 16	Elastic forces			Strength of materials		6)
Sep 21, 23	Circuits			Software tools	Ch. 7	7)
Sep 28, 30	Summations			Engineering economics		8)
Oct 05, 07	Statistics			z-transform		9)
Oct 12, 14	Concept generation	Ch. 8	10)	Concept selection	Ch. 9	a)*
Oct 19, 21	Robot kit check		b)*	VEX sensors and actuators		
Oct 26, 28	VEX programming		c)	Bot build phase		
Nov 02, 04	Bot build phase		d)	Bot build phase		
Nov 09, 11	Bot build phase			Mechanical design check		e)
Nov 16, 18	Bot build phase			Bot build phase		11)*
Nov 23, 25	No class			No class		
Nov 30, Dec 02	Bot build phase			Practice run		
Dec 07, 09	Bot qualifying round		g)	No class		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).

¹ Each team will present their design process to 5th grade students at Martin Technology Academy online. Each team will be assigned a different in-class time to make the presentation.