

MTRE 1000 Introduction to Mechatronics Engineering Spring 2020

Instructor

Kevin McFall (lecture), **Alexander Fouraker** (laboratory Monday), **Meiling Sha** (laboratory Wednesday)

E-mail: kmcfall@kennesaw.edu, afourake@kennesaw.edu, rsha@kennesaw.edu

Office Phone: 470-578-5136

Cell phone: 610-573-6242

Office Location: Q 325

Office Hours: 11 am – noon MTWRF

Course Description

Catalog Description

An introduction to career opportunities in Mechatronics Engineering; familiarization with college and departmental policies, curriculum, and facilities.

Course Details

Term: Spring 2020

Course name: Introduction to Mechatronics Engineering

Course number: MTRE 1000

Section numbers: 01, 02

Meeting times: Lecture W 3:55-4:45 pm

Laboratory M 6:30-9:15 pm (01), W 9:30 am-12:15 pm (02)¹

Room number: Lecture Q104 and laboratory Q118

Learning Outcomes

By the end of this course, students will:

- appreciate the fundamental components that make up mechatronics engineering systems.
- undertake independent research, analysis, and design to creatively solve engineering problems.

Topics covered

- The engineering profession, education in engineering, and introduction to design.
- Engineering solutions and representation of technical information.
- Engineering measurements, estimates, dimensions, units and conversions.
- Technical topics such as energy, statics, strength of materials, circuits, and controls.

Required Materials

No textbook is required for this course.

All students are required to wear safety glasses at all times in the laboratory. Safety glasses will be provided to students at the beginning of the semester, but students having lost their pair are responsible for replacements.

¹ Teams needing extra time to work on their projects are welcome to visit the other lab section (with the understanding instructors will prioritize helping that section's students) as well as during lab open times (with the understanding the student lab assistant may offer limited assistance). Open lab times are posted on the Q 118 door.

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.

Robotics kits will be checked out to each team. **No student is permitted to access any kit other than the one assigned to their team.** Each team must verify the contents of their kit in the beginning and end of the semester. Teams failing to check out their kits with the instructor will receive half points on the first project assignment, and will be assigned an incomplete grade for the course if the kit is not checked back in at the end of the semester.

Course Communication

Course material will be disseminated in D2L including lecture notes, homework assignments, 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.

All Kennesaw State University computer labs provide free use of computers running these applications. Refer to <http://uits.kennesaw.edu/support/labhours.php> for locations/hours of computer labs.

KSU provides technology training and support for students. Use this support for issues with any of the standard campus technologies (such as D2L, KSU wireless, student email, etc.). Students can contact KSU's Technology Services in several ways:

- Email: studenthelpdesk@kennesaw.edu
- Call: 770-499-3555
- Walk-in support: See <http://uits.kennesaw.edu/support/> for times and locations

Late/Missed Assignments and Attendance

In general, late and improperly submitted 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 to be missed. D2L dropboxes will close at the beginning of class on due dates, and late and improper submissions will be assigned a zero grade.

Grading Policy

Attendance	5%
Lab cleanliness	10%
Assignments	50%
Project	35%
Total	100%

Grade Conversion: A: (90-100), B: (80-89), C: (70-79), D: (60-69), F: (0-59)

Attendance (5%)

Typically, attendance is generally not recorded in my other classes. College is supposed to be filled with adults acting like adults. However, to get you in the habit of acting responsibly, 5% of the overall grade will be based on attendance in both lecture and lab. Late arrival to class (after your name has been called) results in a 75% attendance grade for the day.

Lab cleanliness (10%)

Each team is allocated a dedicated workspace in the lab, which is expected to remain tidy. When leaving lab, no stray items are allowed left on the workspace. A partially, or completely, built robot may be remain as long as it is connected as a single piece. Any trash or spare parts left will result in a 10% point deduction from the lab cleanliness grade. A similar deduction results from losing or damaging important robotic parts such as motor leads breaking, lost sensors, etc.

Lecture Assignments (50%)

All graded assignments are weighted equally. A single submission for each team is collected for assignments marked as group submissions. Be sure to include all team members' names, but leave any names off for team members who did not contribute. Due dates for the following topics are marked in the course schedule and are due at the beginning of lecture. See D2L for more detailed descriptions of these assignments.

- 1) Pre-test (individual – see quiz on D2L)
- 2) Literature review exercise as a single JPG, DOCX, or PDF file (individual – see D2L drop box)
- 3) Personality assessment and reflection as a single JPG, DOCX, or PDF file (individual – see D2L drop box)
- 4) Personalized curriculum flowchart as a single JPG, DOCX, or PDF file (individual – see D2L drop box)
- 5) Interview of an engineer as a single JPG, DOCX, or PDF file (individual – see D2L drop box)
- 6) Visit student organization
 - a) Indicate organization, time, and date of meeting to attend (individual – see D2L drop box)
 - b) Reflect on visit to organization as a single JPG, DOCX, or PDF file (individual – see D2L drop box)
- 7) Energy exercise (group – hardcopy submission)
- 8) Statics exercise (group – hardcopy submission)
- 9) Circuits exercise (group – hardcopy submission)
- 10) Foreign-owned engineering company visit
 - a) Indicate company name and address to visit (individual – see D2L drop box)
 - b) Reflect on site visit to company as a single JPG, DOCX, or PDF file (individual – see D2L drop box)
- 11) Controls exercise (group assignment – hardcopy submission)

When submitting assignments 7, 8, 9, and 11 as a hardcopy, be sure to write the team number/letter **and** all the team member names who contributed to the assignment. If the submission includes multiple pages, **do not** fold over the corner of the pages in an attempt to hold them together. Instead, either staple the pages together or write the names of contributing students on **every** page. Failure to follow these instructions will result in a deduction of 1 point (out of 10) from the grade.

Laboratory Assignments (35%)

The term project is a mechatronics design competition using VEX robotic systems. The following items will count equally 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. The following assignments are due at the beginning of the lab meeting for your section. See D2L for more detailed descriptions of these assignments.

- a) Building of the Clawbot (half points if kit not checked)
- b) Remote control Clawbot programmed to autonomously turn around when detecting an obstacle
- c) Concept sketches and decision table as a single JPG, DOCX, or PDF file (see drop box on D2L)
- d) Time management plan for bot build as a single JPG, DOCX, or PDF file (see drop box on D2L)
- e) Complete mechanical design of the prototype with moving parts controlled by remote
- f) Final robot competition challenge in Robot Virtual Worlds
- g) Log of bot build activities and reflection as a single JPG, DOCX, or PDF file (see drop box on D2L)
- h) Online interaction with middle school students working on robotic project
 1. Online post of robot concept and available parts
 2. Online post of robot mechanical design and comments on middle school students' post
 3. Reflection on interaction students as a single JPG, DOCX, or PDF file (see drop box on D2L)

Course Outline

Week of	Laboratory (Monday or Wednesday)		Lecture (Wednesday)	
	Topic	Due	Topic	Due
Jan 06	VEX programming		Introduction	1) ²
Jan 13	Kit check out and clawbot build		Study skills	
Jan 20	Build day (no Monday lab)		Navigating campus	2)*
Jan 27	Clawbot programming	a)	Personality assessment	3)*
Feb 03	Competition reveal	b)	Goal identification	
Feb 10	Concept generation/selection		Coursework and curriculum	6a)*
Feb 17	Bot build/program/test	c)* and d)*	Newton's second law	4)*
Feb 24	Bot build/program/test		Dimensions and units	5)*
Mar 02	Bot build/program/test	h1)	Energy	6b)*
Mar 09	Bot build/program/test		Vectors	10a)*
Mar 16	No lab		Statics	7)*
Mar 23	No lab		Circuits	8)*
Apr 06	Bot build/program/test		PID Control	9)
Apr 13	Bot build/program/test	e) and h2)	Dynamic systems	10b)*
Apr 20	Competition "dress rehearsal"		Engineering careers	
Apr 27	Kit check in (no Tuesday lab)	g)* and h3)*	No lecture	11), f) ³

* Assignments marked with an asterisk are submitted in D2L dropboxes.

*** Assignments marked in red with an asterisk are submitted in D2L dropboxes. Submissions need not be digitally produced, but must be legible, high-quality scans (i.e. not grainy images captured with smart phones) and must be uploaded as a single JPG, DOCX, or PDF file.**

² This online D2L quiz is due Friday January 10 at noon.

³ The controls exercise and robot challenge are due Wednesday April 29 at 3:55 pm and 8:00 pm, respectively.

Federal, BOR, & KSU Course Syllabus Policies

Information contained in the links below constitutes the Federal, BOR, and KSU course syllabus policies and procedures and may be referenced by faculty members in their course syllabi. These policies are updated on the Academic Affairs Website annually.

[Academic Affairs - Federal, BOR, & KSU Policies](#)

[Academic Affairs - KSU Student Resources for Syllabus](#)

Note to Faculty: The KSU faculty handbook requires the Academic Integrity Policy in the course syllabus.

Note to Faculty and Students: The Office of the Provost will work to keep the policies and links in this document as accurate as possible.

Academic Integrity Statement

Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section 5c of the Student Code of Conduct addresses the university's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement. See also [KSU Student Code of Conduct](#).

Electronic Communication

The University provides all KSU students with "official" email accounts with the addresses "students.kennesaw.edu" and "kennesaw.view.usg.edu" (in D2L). As a result of federal laws protecting educational information and other data, these are the sole email accounts you should use to communicate with your instructor or other University officials.