

MTRE 1000 Introduction to Mechatronics Engineering Fall 2020

Instructor

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Course Description

Catalog Description

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

Course Details

Term: Fall 2020
Course name: Introduction to Mechatronics Engineering
Course number: MTRE 1000
Section numbers: 01, 02, 03, 04
Meeting times: Lecture F 11:15 am - 12:05 pm
Laboratory M 3:30 pm - 6:15 pm (01), T 2:00 pm - 4:45 pm (02),
T 11:00 am - 1:45 pm (03), M 6:30 pm - 9:15 pm (04)
Room number: Lecture Q 202 and laboratory Q 118

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. Each team will need access to a personal computer capable of running [RobotC for VEX Robotics](#) and [Robot Virtual Worlds](#). Ideally every student will have a copy on their own computers, but each team must have at least one. Inform the instructor if this is an issue in order to make alternate arrangements. In order to submit assignments using Robot Virtual Worlds, you will also need screen capture software, many of which are [available freely online](#).

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.**

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.

Late/Missed Assignments

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. Late and/or improperly submitted work in D2L drop boxes will be assigned a zero grade.

Grading Policy

| | |
|---------------------|-------------|
| Lecture assignments | 50% |
| Lab attendance | 5% |
| Lab cleanliness | 5% |
| Lab assignments | 40% |
| Total | 100% |

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

All assignments other than the final robot challenge will be graded on the following scale:

- 10 points: all or nearly all requirements met
- 8 points: many/most requirements met with an obviously serious attempt made
- 3 point: minimal effort is evident
- 0 points: little or no effort made

Attendance (5%)

Participation in the face to face (F2F) labs is essential and required. Late arrival to class (after your name has been called) results in a 75% attendance grade for the day.

Lab cleanliness (5%)

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 placed neatly on the counter along the windows. Any trash or spare parts left will result in a 10% point deduction from the lab cleanliness grade. A similar deduction results may result from negligently lost or damaged 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)
- 2) Literature review exercise (individual)
- 3) Personality assessment and reflection (individual)
- 4) Personalized curriculum flowchart (individual)
- 5) Interview of an engineer (individual)
- 6) Visit student organization
 - a) Indicate organization, time, and date of meeting to attend (individual)
 - b) Reflect on visit to organization (individual)
- 7) Energy exercise (team)
- 8) Statics exercise (team)
- 9) Circuits exercise (team)
- 10) Foreign-owned engineering company visit
 - a) Indicate company name and address to visit (individual)
 - b) Reflect on site visit to company (individual)
- 11) Controls exercise (team)

When submitting assignments as a team, be sure to write the team number/letter **and** all the team member names who contributed to the assignment. Only team members whose names appear on the assignment will receive a grade for it.

Laboratory Assignments (40%)

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
- b) Robot Virtual Worlds (RVW) programming task
- c) Implement RVW programming task on physical clawbot
- d) Concept sketches and decision table
- e) Final robot competition challenge

Course Outline

| Week of | Laboratory (Monday or Tuesday) | | | | Lecture (Friday) | |
|---------|--------------------------------|-----|---------------------------|-----|---------------------------------------|------------------|
| | Cohort Alpha | Due | Cohort Num | Due | Topic (which cohort attends F2F) | Due |
| Aug 17 | No lab meeting | | No lab meeting | | Introduction (Section 01 and 02) | 1) ¹ |
| Aug 24 | Intro to VEX | | Intro to RVW ² | | Study skills (Alpha) | |
| Aug 31 | Intro to RVW | | Intro to VEX | | Navigating campus (Num) | 2) |
| Sep 07 | No lab meeting | | No lab meeting | | Personality assessment (Num) | 3) |
| Sep 14 | Clawbot build | a) | RVW program | b) | Goal identification (Alpha) | |
| Sep 21 | RVW program | b) | Clawbot build | a) | Coursework and curriculum (Num) | 6a) |
| Sep 28 | Clawbot program | c) | Engineering design | d) | Newton's second law (Alpha) | 4) |
| Oct 05 | Engineering design | d) | Clawbot program | c) | Dimensions and units (Num) | 5) |
| Oct 12 | Build | | Program | | Energy (Alpha) | 6b) |
| Oct 19 | Program | | Build | | Vectors (Num) | 10a) |
| Oct 26 | Build | | Program | | Statics (Alpha) | 7) |
| Nov 02 | Program | | Build | | Circuits (Num) | 8) |
| Nov 09 | Test | | Test | | PID Control (Alpha) | 9) |
| Nov 16 | Competition | e) | Competition | e) | Dynamic systems (Num) | 10b) |
| Nov 30 | No lab meeting | | No lab meeting | | Engineering careers (everyone remote) | |
| Dec 07 | No lab meeting | | No lab meeting | | No lecture | 11) ³ |

- * Each section will be split into two cohorts (Alpha and Num) that will alternate weeks with F2F and remote activities.
- * Activities **marked in magenta** take place F2F and the assignment must be demonstrated at the end of lab that day.
- * Activities **marked in blue** take place virtually and the assignment is due at noon on Friday of that week.
- * **Test** and **Competition** activities are not divided by cohort, but rather each team in both cohorts will send half their members to represent the team on both days.
- * Assignments 2 through 10 are due in a D2L assignment drop box at the **beginning** of lecture on the day marked. Any files submitted must be of RTF, DOCX, JPG, or PDF extensions or will result in a zero grade.

Organization of class times to accommodate social distancing

Students from all four sections meet at the same time on Friday at 11:15 am for lecture, while each individual section has its own specific laboratory time. See the [dynamic schedule](#) and find your lab time to identify your section number. Each section will be further divided into cohorts, named Alpha and Num. Each cohort will be further divided into three teams, which will work together both in lecture and lab. Alpha cohort teams will be assigned a team letter, while Num cohort teams have a number. For lectures, one cohort will attend F2F in Q 202 while the other cohort attends [online via D2L](#). Both cohorts will follow the same material synchronously. For labs, one cohort attends in person and the other virtually. However, the virtual lab cohort will work on a different task and have until the end of the week to submit any assignments due. It is up to the team to organize how and when to meet for their virtual lab assignments. Delivery modes are organized so the same cohorts have both lab and lecture in the same modality (F2F or virtual) each week.

| Section 01 | | Section 02 | | Section 03 | | Section 04 | |
|------------|--------|------------|--------|------------|--------|------------|---------|
| Alpha | Num | Alpha | Num | Alpha | Num | Alpha | Num |
| Team A | Team 1 | Team D | Team 4 | Team G | Team 7 | Team J | Team 10 |
| Team B | Team 2 | Team E | Team 5 | Team H | Team 8 | Team K | Team 11 |
| Team C | Team 3 | Team F | Team 6 | Team I | Team 9 | Team L | Team 12 |

¹ This online D2L quiz is due Friday August 21 at 11:59 pm.

² For the Intro to RVW, install [RobotC](#) and [RobotVirtualWorlds](#) (use the free trial for now) and recreate the Test of Robot Virtual Worlds found on D2L under Content – Laboratory. Reach out to your lab instructor with questions.

³ The controls exercise is due Friday December 11 at 11:15 am.

COVID-19 Safety Precautions

Face Masks in the classroom

As mandated by the University System of Georgia, the university requires the use of face masks in the classroom and in KSU buildings to protect you, your classmates, and instructors. Per the University System of Georgia, anyone not using a face covering when required will be asked to wear one or must leave the area. Repeated refusal to comply with the requirement may result in discipline through the applicable conduct code.

Reasonable accommodations may be made for those who are unable to wear a face covering for documented health reasons. Please contact Student Disability Services at sds@kennesaw.edu for student accommodation requests.

Shifting Modalities

Please note that the university reserves the right to shift teaching modalities at any time during the semester, if health and safety guidelines require it to do so. Some teaching modalities that may be used are F2F, Hyflex, Hybrid, or online, both synchronous and asynchronous instruction.

Staying Home When Sick

If you are ill, please stay home and contact your health professional. In that case, please email the instructor to say you are missing class due to illness. Signs of illness include, but are not limited to, the following:

- Cough
- Fever of 100.4 or higher
- Runny nose or new sinus congestion
- Shortness of breath or difficulty breathing
- Chills
- Sore Throat
- New loss of taste and/or smell

Institutional Policies

Information contained in the link below constitutes the Federal, BOR, and KSU course syllabus policies. These policies are updated on the Academic Affairs website annually.

[Federal, BOR, & KSU Course Syllabus Policies](#)

KSU Student Resources

This link contains information on help and resources available to students:

[KSU Student Syllabus Resources](#)