Introduction to Mechatronics Engineering
MTRE 1000 – Spring 2017

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: Spring 2017
Course name: Introduction to Mechatronics Engineering
Course number: MTRE 1000
Section numbers: 1, 2, C09
Meeting times: Lecture M 12:00-12:50 and laboratory M 2:00-4:45, W 5:00-7:45, and W 2:00-4:45
Room number: Lecture Q106, and laboratory Q118

Learning Outcomes

By the end of this course, students should:

- 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

- 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

Textbook

All students are required to wear safety glasses at all times in the laboratory. Safety glasses will be provided to students for which this is their first Mechatronics Engineering laboratory. Students having lost their pair are responsible for replacements.

Oakes, Leone, Gunn, *Engineering Your Future: A Brief Introduction to Engineering*, 4th edition, Oxford University Press, 2012. Purchasing the textbook is optional.

Learning Community

Together with EDG 1211 Engineering Graphics I, this course is part of the Learning Community (LC) for Mechatronics Engineering students. The primary LC goal is to help entering freshman succeed by plugging them into college life and prepare for the academic rigor of our program. Some assignments for this course involve CAD drawings, making the connection to the sister course in the LC. The lecture portion of the course will combine both LC and non-LC students.

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. Kits are organized in separate cabinets for Monday and Wednesday lab sections. Monday kits are labelled with letters and Wednesday kits labelled with numbers. **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 price 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 solutions, 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 Policy

Participation	20%
Assignments	50%
Project	30%
Total	**100%**

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

Participation (20%)

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, 60% of these 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 40% of these 10 points is assigned for keeping the team workspace and robot parts depots tidy, and not damaging or losing important robotic parts. 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. D2L dropboxes will close at the beginning of class on due dates, and late submissions will be assigned a zero grade.

Assignments (50%)

Eleven graded assignments are weighted equally. These are due at the beginning of the lecture. A single submission for each team will be collected for assignments not marked as individual. 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.

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) Visit student organization meeting (individual assignment – see drop box on D2L)
10) Engineering economics exercise
11) Statistics exercise

Robotics Project (30%)

The term project is a mechatronics design competition using VEX robotic systems. The following items will count towards the project grade. These assignments are due at the beginning of your lab session in the week indicated. Generally, the same grade will be shared by all team members although those found not contributing to the effort may receive reduced scores.

a) Building of the Clawbot by following the modified instructions posted on D2L (half points if kit not checked)
b) Remote control Clawbot programmed to autonomously turn around when bumper button pressed
c) Sketches of at least four concepts with decision table as a single JPG, DOC, or PDF file (see drop box on D2L)
d) Drawing of custom robot part as a single JPG, DOC, or PDF file (see drop box on D2L)
e) Complete mechanical design of the prototype with moving parts controlled by remote
f) Vlog post answering questions from students at Martin Technology Academy
g) Robot competition score[1]
h) High quality drawing of the final prototype as a single JPG, DOC, or PDF file (see drop box on D2L)

Course Outline

	Lecture (Monday)			Laboratory (Monday or Wednesday)	
Week of	**Topic**	**Read**	**Due**	**Topic**	**Due**
Jan 09	Introduction			Kit check out	
Jan 23	Coursework and curriculum	Ch. 5	**1)***	VEX programming	
Jan 30	Dimensions and units	Ch. 6		Clawbot programming	a)
Feb 06	Unit conversions		**2)***	Competition reveal	b)
Feb 13	Energy		**3)***	Concept generation/selection	
Feb 20	Vectors		**4)***	Bot build	**c)***
Feb 27	Statics		5)	Bot build	
Mar 06	Strength of materials			Bot build	
Mar 13	Circuits		6)	Bot build	
Mar 20	Software tools	Ch. 7	7)	Bot build	d)
Mar 27	Summations		8)	Bot build	e)
Apr 10	Engineering economics			Bot build	
Apr 17	Statistics		**9)***	Bot build	f)
Apr 24	z-transform		10)	Competition dress rehearsal	
May 01	Majors and careers	Ch. 2,3,12	11)	Kit check in	**h)***

*** Assignments marked in red with an asterisk are submitted on D2L 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) and must be uploaded as a single JPG, DOCX, or PDF file.**

[1] The robot competition will take place in the afternoon of April 28 outside of class time.

Help Resources

Contacts to get Help

Student Help Desk studenthelpdesk@kennesaw.edu or call 470.578.3555
KSU Service Desk[2]
D2L Student User's Guide[3]

Additional Resources

Remote access to Library Resources[4]
Student success Services[5]
Tutoring and Academic Support[6]
Academic Advising[7]
University bookstore[8]

University Policies

Academic Honesty

Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section II 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 University Judiciary Program, 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.
All acts of academic misconduct will be documented with the Student Academic Misconduct Incident form and included on the student's academic record.

Plagiarism Policy

No student shall receive, attempt to receive, knowingly give or attempt to give unauthorized assistance in the preparation of any work required to be submitted for credit as part of a course (including examinations, laboratory reports, essays, themes, term papers, etc.). When direct quotations are used, they should be indicated, and when the ideas, theories, data, figures, graphs, programs, electronic based information or illustrations of someone other than the student are incorporated into a paper or used in a project, they should be duly acknowledged.

Assignments may not be copied, not even in part, from any other source without proper citation. Collaboration on assignments among students and other individuals is wholeheartedly encouraged. In order to avoid possible plagiarism issues, limit such collaboration to discussion of how to approach the problem and what strategies, equations, and techniques should be used to solve it. When actually writing down your

[2] https://apps.kennesaw.edu/portal/prod/app_its_ask_stu_publ/student/
[3] https://apps.kennesaw.edu/files/pr_app_uni_cdoc/doc/D2LBrightspaceStudentguide_10.3.pdf
[4] http://library.kennesaw.edu/
[5] http://www.kennesaw.edu/studentsuccessservices/
[6] http://learnonline.kennesaw.edu/student-resources/tutoring.php
[7] http://advising.kennesaw.edu/
[8] http://bookstore.kennesaw.edu/home.aspx

solution, ensure you (and your team-members as appropriate) are not in the same room as outside collaborators. Your solution will then be written in your own words and therefore not plagiarized.

Disability Statement

Kennesaw State University provides program accessibility and reasonable accommodations for persons defined as disabled under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Kennesaw State University does not deny admission or subject to discrimination in admission any qualified disabled student.

A number of services are available to help students with disabilities with their academic work. In order to make arrangements for special services, students must visit the Office for Student Disability Services and make an appointment to arrange an individual assistance plan. In most cases, certification of disability is required.

Special services are based on

- medical and/or psychological certification of disability,
- eligibility for services by outside agencies, and
- ability to complete tasks required in courses.

ADA Position Statement

Kennesaw State University, a member of the University System of Georgia, does not discriminate on the basis of race, color, religion, age, sex, national origin or disability in employment or provision of services. Kennesaw State University does not discriminate on the basis of disability in the admission or access to, or treatment or employment in, its programs or activities.

The Americans with Disabilities Act (ADA), Public Law 101-336, gives civil rights protections to individuals with disabilities. This statute guarantees equal opportunity for this protected group in the areas of public accommodations, employment, transportation, state and local government services and telecommunications.

The following individuals have been designated by the President of the University to provide assistance and ensure compliance with the ADA. Should you require assistance or have further questions about the ADA, please contact:

- ADA Compliance Officer for Students: 470-578-6443
- ADA Compliance Officer for Facilities: 470-578-6224
- ADA Compliance Officer for Employees: 470-578-6030

For more information, go to: http://www.kennesaw.edu/stu_dev/dsss.