Kennesaw State University
Syllabus
Southern Polytechnic College of Engineering and Engineering Technology
Department of Robotics and Mechatronics Engineering
MTRE 4912: Mechatronic Prototype Development
2024 Spring

Course Information

Class meeting time:

MW 3:30–6:15

Modality and location:

Face-to-face — KSU may shift the method of course delivery at any time during the semester in compliance with University System of Georgia health and safety guidelines. In this case, alternate teaching modalities that may be adopted include hyflex, hybrid, synchronous online, or asynchronous online instruction.

Engineering Technology Center (Building Q), room 118

This syllabus is posted in D2L.

Instructor Information

Matt Marshall

Email: `mqm@kennesaw.edu`

Office location: Q 317

Office phone: (470) 578-5135

Office hours: MW 12:45–3:15

Preferred method of communication: email

(Be sure to use `mqm@kennesaw.edu` and not the `@kennesaw.view.usg.edu` account. That is, do not use D2L to send emails to the instructor.)

Course Description

Prerequisites: MTRE 4911

Credit hours: 6 laboratory hours = 2 credit hours

This is a laboratory course designed to complement the mechatronics system design aspects also covered in MTRE 4911. The implementations of mechanical and electrical devices and systems, and cost considerations are covered. The course focuses on reliability, safety, energy and environmental issues, ethics, patents, product liability, time value of money, return on investment, and breakeven analysis. The design project is a capstone for the Mechatronics Engineering program. Projects proposals are completed and approved prior

to the developments. Project implementations require planning, presentation, scheduling, engineering, and written and oral presentations of project results. Students are encouraged to utilize concepts learned from courses throughout the program.

Course Materials

Required texts:

none

Recommended texts:

Transdisciplinary Engineering Design Process, by Atila Ertas, ISBN 13: 9781119474753

Technology requirements:

Laptop / Desktop Computer, MATLAB, Python, C++, Linux OS (Depending on application)

Learning Outcomes

By the end of this course, students should:

- Be able to apply mathematics, science, and engineering to a project.
- Be able to implement systems, components, and processes to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Be able to function in multi-disciplinary teams.
- Be able to identify, formulate, and solve engineering problems.
- Have an understanding of professional and ethical responsibility.
- Be effective communicators through both oral and written mediums.
- Be able to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Be able to design and deliver a successful project completion presentation.

Course Requirements and Assignments

The primary deliverables in this course are a report defending the design process of a mechatronic system and a working prototype thereof. The actual systems can vary greatly, however, all projects must include the following elements.

- Mechanical design
- Data acquisition from sensor(s)
- A programmable computing device
- Actuation control

Teams will ideally comprise either three or four members.

Engineering problem statement draft   To ensure the engineering problem statement is clearly specified at the outset of the project, a draft will be due the third week of lab. One requirement for the design is that it meet at least one standard of your choosing; in this draft, you should show progress towards identification of a standard. The draft will be discussed with the entire class in order to strengthen the problem statement.

Engineering problem statement (final)   This final draft of the engineering problem statement contains the design objectives that the team is committing to meet by the time of its prototype demonstration. The standard(s) your design will meet must be identified here also.

Design objectives reflection   After having learned a good bit about the selected mechatronic system, the team is to submit an alternative set of design objectives that it feels is more realistic. In other words, if the team could go back and tell its beginning-of-the-semester self what to write for design objectives, what would they look like?

For the assignment, also state what you've learned in the weeks since the start of the semester that would motivate the changes to your design objectives.

For lab that week, be prepared to share one thing your group has learned, either about yourselves or the project area, that would have been nice to know before writing the engineering problem statement in January.

Poster   The senior-design expo requires that each team share a poster outlining the design process and results. Printing is provided by the college if desired.

Prototype demonstration   Prior to the senior-design expo, each team will demonstrate its prototype meeting the design objectives given in the engineering problem statement. This is a pass/fail grade item; either the prototype meets the performance goals and the team gets full credit (30% of the course grade) or the prototype fails to meet one or more goals and the team gets a 0.

Final presentation rehearsal   On the morning of the senior-design expo, you will give a 5 minute, high-level presentation on your project to the department's industry advisory board (IAB). Your presentation should be similar to the engineering problem statement — you'll show the need, describe your goal, and lay out the design objectives. There are two more things: you will also show that you met the design objectives and mention the major technologies used. Remember, though, you've only got five minutes! During lab the previous week, each group will practice its presentation in front of the class with a few minutes for feedback from peers and the instructor.

Overview video   A two minute video chronicling the development of the prototype and showing it perform will be shown directly after the final presentation.

Project report   A 6–8 page report in IEEE format is required that will introduce the project and its context, describe its major components and design, present experimental data (including at least one plot), and provide a conclusion and/or direction for future work. It is due in three stages:

- §1–2: Introduction and literature review

- §1–5: Revisions to §1–2, plus §3 — theory, equations, calculations, etc.; §4 — prototype system description; and §5 — measurements, results, models, etc.

- Final draft: Revisions to §1–5, plus abstract and §6 — conclusion and/or suggestions for future work

Reports (and drafts) are to be submitted as PDFs created via either LaTeX(preferred) or Microsoft Word. Templates will be provided for both systems.

Peer evaluation   Team members will score each other based on perceived contribution to the project. This is the only individual (as opposed to group) assignment in the course. More instructions are to be found in the assignment description on D2L.

Evaluation and Grading Policies

Grades are converted as: A 90–100, B 80–89, C 70–79, D 60–69, F 0–59. Grade items and their respective weights are given in the table below.

Assignment	Weight
Engineering problem statement draft	2%
Engineering problem statement final	5%
Design objectives reflection	3%
Poster	10%
Demonstration	30%
Final presentation rehearsal	7%
Overview video	3%
Project report, §1–2	5%
Project report, §1–5	10%
Project report final draft	10%
Peer evaluation	15%

Items will be graded within two weeks of submission. Grades will be rounded up if they are at 0.5 or above. For example, an 89.6 is an A and 79.2 is a C.

Course Policies

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 canceled, will be posted in the D2L course news. Be sure to check D2L regularly. The University provides all KSU students with an "official" email account with the address `students.kennesaw.edu` or `kennesaw.view.usg.edu` (in D2L). As a result of federal laws protecting educational information and other data, this is the sole email account you should use to communicate with your instructor or other University officials. (As stated in Instructor Information above, for this course you should use only the `students.kennesaw.edu` address.)

Late/Missed Assignments: In general, late and improperly submitted assignments are not accepted. Extenuating circumstances can result in exceptions to this rule, but either agreement must be reached with the instructor in advance of the assignment due date or evidence should be provided showing events outside of your control that prevented punctual submission of the work.

Course Schedule

Lab	Lab
Jan 8th Course outline and project expectations	10th
15th **M.L.K. Day**	17th Engineering problem statement draft due
22nd	24th
29th	31st
Feb 5th	7th
12th	14th
19th	21st §1–2 of project report due
26th	28th Finalized engineering problem statement (set-in-stone design objectives) due

Lab	Lab
Mar 4th	6th
11th **Spring Break**	13th **Spring Break**
18th	20th
25th	27th
Apr 1st	3rd
8th *Professor Marshall out of town*	10th *Professor Marshall out of town*
15th Design objectives reflection assignment due	17th §1–5 of project report due
22nd Poster due	24th Demonstration — Rehearsal for final presentations — Overview video due
29th Final presentations and senior-design expo (tentative date) — *last day of classes for Spring 2024 semester*	May 1st *final exams week (no final for this course)*
6th Project report final draft due — Peer evaluations due — *final exams week (no final for this course)*	8th

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 universitys 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 Conducts minimum one semester suspension requirement.

KSU Disruption of Campus Life Policy

All students are responsible for knowing the information, policies and procedures outlined in the Kennesaw State University Codes of Conduct. Student Conduct and Academic Integrity (SCAI) includes: the general Student Code of Conduct, the Residential Code of Conduct, and the Code of Academic Integrity.

KSU Web Accessibility Policy Statement

Federal law Section 508 Subsection 1194.22 of the Rehabilitation Act and the Board of Regents (BOR) of the University System of Georgia (USG) Web Accessibility Guidelines require that all web content meet the federal governments accessibility guidelines. As such, KSU complies with USG guidelines.

University accessibility assistance is provided by several offices as noted below. Staff in these offices work to accommodate requests for access or assistance with access as soon as possible in order to either accommodate the request or identify an effective alternative for the requester.

REQUEST FOR	OFFICE	CONTACT NUMBER	CONTACT EMAIL (@kennesaw.edu)
Student Support Services	Student Disability Services	470.578.2666	studentdisability
Student Technology Assistance	University Information Technology Services	470.578.3555	studenthelpdesk
Third Party Technology Assistance	University Information Technology Services	470.578.3555	service

KSU Reasonable Accommodations Policy

Students with qualifying disabilities under the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act who require reasonable accommodation(s) to complete the course may request those from Office of Student Disability Services. Students requiring such accommodations are required to work with the Universitys Office of Student Disability Services rather than engaging in this discussion with individual faculty members or academic departments. If, after reviewing the course syllabus, a student anticipates or should have anticipated a need for accommodation, he or she must submit documentation requesting an accommodation and permitting time for a determination prior to submitting assignments or taking course quizzes or exams. Students may not request retroactive accommodation for needs that were or should have been foreseeable. Students should contact the office as soon as possible in the term for which they are seeking accommodations. Student Disability Services is located in the Carmichael Student Center in Suite 267 on the Kennesaw campus or Building A in Suite 160G on the Marietta campus. Please visit the Student Disability Services (SDS) website for more information, or call the office at 470-578-2666 (Kennesaw campus) or 470-578-9111 (Marietta campus).

KSU Enrollment Management/Course Attendance Policy

Students are solely responsible for managing their enrollment status in a class; nonattendance does not constitute a withdrawal.

Copyright Law

It is the responsibility KSU faculty and students to respect the rights of copyright holders and complying with copyright law. The University System of Georgia recognizes that the exclusive rights of copyright holders are balanced by limitations on those rights under federal copyright law, including the right to make a fair use of copyrighted materials and the right to perform or display works in the course of face-to-face teaching activities.

The University System of Georgia facilitates compliance with copyright law and, where appropriate, the exercise in good faith of full fair use rights by faculty and staff in teaching, research, and service activities. The University System of Georgia ensure compliance with copyright law in the following ways.

A The USG informs and educates students, faculty, and staff about copyright law, including the limited exclusive rights of copyright holders as set forth in 17 U.S.C. 106, the application of the four fair use factors in 17 U.S.C. 107, and other copyright exceptions.

B The USG develops and makes available tools and resources for faculty and staff to assist in determining copyright status and ownership and determining whether use of a work in a specific situation would be a fair use and, therefore, not an infringement under copyright law;

C   The USG facilitates use of materials currently licensed by the University System of Georgia and provides information on licensing of third-party materials by the University System; and

D   The USG identifies individuals at the University System and member institutions who can counsel faculty and staff regarding application of copyright law.

Protecting Students' Privacy (FERPA)

Students have certain rights to privacy. These rights are mandated by federal policy. Leaving their work in an unsecured area such as outside your office door (unless agreed upon with each student) means that the students names and grades and possibly social security numbers are accessible to everyone. Additionally, research papers can be taken and used by other individuals. It is recommended that you permit students to retrieve their work from your office if you dont return it to them in class. Information should not be made public in any way in which a students grades, social security number, or other personal information may be identified. Grade information may be shared with members of the KSU community who also have a legitimate educational interest in student success (e.g. academic advisors or members of the Behavioral Response Team). Faculty may be asked to provide early alert information if there is a concern that a student is at risk, academically or otherwise.

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.

The Student Handbook (select Student Handbook in the Drop Down list in upper right corner) contains information regarding Rights Pertaining to Student Records, and FERPA specific details are available on the Registrar's website.

Privacy in the Education Process   A key requirement of the formal evaluation process is the protection of individual privacy rights concerning educational grading. The Universitys online learning system and email system is designed to prevent unauthorized individuals from gaining access to sensitive information or information protected by federal or state law. Consequently, faculty and students are strongly encouraged to only communicate regarding course matters through the Universitys designated technology learning system.

KSU Sexual Misconduct Policy

In accordance with federal and state law including, Title IX of the Education Amendments of 1972 (Title IX) and Title VII of the Civil Rights Act of 1964 (Title VII), the University System of Georgia (USG), including Kennesaw State University, prohibits discrimination on the basis of sex in any of its education programs or activities or in employment. The USG is committed to ensuring the highest ethical conduct of the members of its community by promoting a safe learning and working environment. To that end, Kennesaw State University follows USG Board of Regents Policy Manual, Section 6.7. See https://equity.kennesaw.edu/titleix/title-ix.php.

Withdrawal from Classes

Students who withdraw from courses before the withdrawal deadline, as specified by the academic calendar will receive a grade of W. A student who officially withdraws from a course will receive a grade of W and receive no credit.

Students may drop one, some, or all of their classes during the drop/add period. Courses dropped in this manner do not appear on a students transcript and are not considered as hours attempted for financial aid purposes. No grade is assigned for such courses. However, a student who wishes to withdraw from a course after the last day of the drop period for a term must withdraw through Owl Express. Students with

an active registration hold on their record must clear that hold before being able to withdraw from their coursework.

If a student experiences significant personal hardship (e.g., medical or family emergency, prolonged illness), the Dean of Students can approve a hardship withdrawal from all courses in the term for which the student is currently registered. In the case of an approved hardship withdrawal from all courses, the Registrar will assign grades of W for those classes. The deadline for final approval of a hardship withdrawal by Dean of Students is the last day of class for which the hardship withdrawal is sought. If the hardship withdrawal process is not complete by the last day of class for which the hardship withdrawal is sought, a student must appeal for a retroactive hardship withdrawal from the Academic Appeals Committee.

Appeals for retroactive hardship withdrawals must be directed to the Academic Standing Committee. Retroactive hardship withdrawals are rarely granted if it has been more than one year since the last day of class for which the withdrawal is sought. Extraordinary justification must be shown. In the case of approved retroactive hardship withdrawals, the Registrar will assign a grade of W.

If a student is suspended by the Office of Student Conduct following a violation of the Universitys Code of Conduct not related to academic dishonesty, the Office of Student Conduct may facilitate a University-initiated withdrawal from courses for which a student is registered for the term. The Registrar will assign grades of W for those classes.

A student will receive a refund only when the student withdraws from ALL courses for the applicable semester and only by the schedule outlined in the University refund policy.

Students should be aware that a reduction in their hours might result in the loss of full-time student status and thus affect their financial aid, scholarships, athletic and ticket eligibility, University housing accommodations, use of University resources and access to University facilities, immigration status for international students, and Veterans Educational Benefits. Students should contact the appropriate office and their academic advisor with questions about the impact of their withdrawal from a course before initiating a withdrawal. Veterans and dependents of veterans who receive educational benefits must notify the Veterans Education Benefits Area in the Office of the Registrar of any course load reductions.

Military Withdrawals A student will receive a WM symbol for all courses and a full refund of tuition and mandatory fees and a pro rata refund of other fees for military and other service, as defined by BOR Policy Manual, Section 7.3.5.3. To request a military withdrawal, the student must submit a copy of official orders to the Office of the Registrar.

KSU Graduate Course Auditing Policy (Graduate Courses Only)

Auditing of courses will be permitted for regularly enrolled graduate students, as well as on a space-available basis for those who hold a graduate degree from Kennesaw State. Auditing courses is not allowed in the Coles Doctor of Business Administration, the Coles Executive MBA, the Master of Science in Conflict Management (MSCM), the Master of Science in Information Systems (MSIS), or any of KSUs Master of Education (M.Ed.) programs. Students must have completed all prerequisites necessary for the course to be audited and are expected to complete all course requirements as noted on the course syllabus. A student may audit no more than 6 credit hours of graduate course work in a given term.

The grade of V will be given for successfully completed audited courses. This grade will have no effect upon the students grade-point average, and students will not be permitted to have the audit grade changed at any future date. Audited courses will not count toward degree completion for any of KSUs graduate programs.

The permission to audit form, available in the Office of the Registrar, must be submitted before the end of final registration. The form must be signed by the Graduate Program Director of the program offering the course to be audited. Audited courses count at full value in computing the students course load and fees. The students name will appear on the official class rolls of the courses audited, as well as the students approved schedule of courses. No credit is granted for audited courses, and students are not permitted to change to or from an auditing status except through the regular procedures for schedule changes.

Academic Feedback

Institutional Chief Academic Officers will encourage faculty to clarify for students, at the beginning of each course, the basis on which grades will be determined and to provide timely academic feedback as the

course progresses (BOR Academic and Student handbook policy 2.18).

Netiquette: Communication Courtesy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats.

Inclement Weather Policy

During the course of the year, Kennesaw State University may decide to close campus or operate on a delayed schedule in cases of inclement weather.

The University will announce campus closures and delayed schedules in several ways. The cell phone number on file with the university will automatically receive KSU Alerts, so make sure your information in OwlExpress is accurate at all times. An email will also be sent to your university account.

In addition, announcements will be made by a notice on the Kennesaw State University home page.

KSU Student Resources

This link contains information on help and resources available to students: KSU Student Syllabus Resources.

Any Additional Institutional Policies

Covering all the bases