SAINT LOUIS UNIVERSITY
SCHOOL OF SCIENCE AND ENGINEERING

MENG 2400: Mechatronics System Design

COURSE SPECIFIC INFORMATION:

All SSE course syllabi comply with the University policies and guidelines HERE

1. COURSE INFORMATION

- **Course Number & Section:** MENG 2400
- **Course Title:** Mechatronics System Design
- **Credit Hours:** 3
- **Term:** Spring 2026
- **Meeting Days & Times:** Tuesday & Thursday, 2:15 – 3:30 PM
- **Location:** McDonnell Douglas Hall, Room 270
- **Prerequisites / Co-requisites:** ECE 1100, ECE 1200
- **Course Description:** This undergraduate course introduces students to the interdisciplinary field of mechatronics, integrating mechanical systems, electronics, sensors, actuators, and embedded computing. Students will develop hands-on experience designing, prototyping, and testing intelligent systems using microcontrollers such as Arduino. Emphasis is placed on systems-level thinking, structured programming, and practical engineering applications through laboratories and project-based learning.

2. INSTRUCTOR INFORMATION

- **Instructor Name:** Madi Babaiasl
- **Office Location:** MDDH 2051
- **SLU Email:** madi.babaiasl@slu.edu
- **Office Hours:** Ad hoc on request
- **TA / Peer Instructor information**: Nick Hawkins, nick.m.hawkins@slu.edu

3. STUDENT LEARNING OUTCOMES (SLOs)

At the end of this course, students will be able to:

- *Explain* fundamental concepts of mechatronics systems, including basic electronics, sensors, actuators, and embedded controllers.
- *Apply* systems design principles to develop mechatronic solutions that integrate mechanical, electrical, and software components.
- *Program* microcontroller-based systems (e.g., Arduino) using structured programming techniques to interface with sensors and actuators.
- *Analyze* system behavior using experimental data and debugging tools to identify and correct hardware or software issues.
- *Design* and document a functional mechatronic system through laboratory work and project-based assignments.
- *Communicate* technical results effectively through written reports, demonstrations, and oral presentations.

4. REQUIRED MATERIALS & TECHNOLOGY

- **Textbooks and/or course texts:** There is no required textbook for this course. Course materials, including lecture notes, tutorials, and reference documents, will be provided by the instructor via the course GitHub repository: https://github.com/madibabaiasl/mechatronics-course/wiki

The following texts are recommended for additional reference:

[1] Bolton, W. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering. Pearson.
[2] Bishop, R. H. (Ed.). Mechatronics: An Introduction. CRC Press.
[3] Alciatore, D. G. Introduction to Mechatronics and Measurement Systems. McGraw-Hill.

- **Other materials and/or equipment:** Students will use laboratory hardware provided by the department, including Arduino microcontroller boards, sensors, actuators (DC motors, servo motors, stepper motors), breadboards, electronic components, motor drivers, power supplies, and measurement tools.

  Students must have access to a personal computer capable of running the required software. Required or supported software includes Arduino IDE, MATLAB, Excel, and Python. Additional materials or software requirements, if any, will be communicated in advance.

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5. EVALUATION & GRADING

- **Evaluation Components:**
  i. **Labssons Completion and Reports (50%):** Labssons are completed in *pairs*. Each student submits an *individual* written report. Grades are based on participation, self & peer review, technical accuracy, and clarity of documentation. Groups who are unable to finish the labs during the class time must meet outside of the class to finish the labs.
  ii. **Projects (50%):** Two project assignments will be completed in pairs and include a functional prototype, a presentation, and a written reflection report. Grades are based on participation, self & peer review, independent reviewers, technical accuracy, and clarity of documentation. Groups who are unable to finish the projects during class time must meet outside of class to finish the projects.
- **Grading scales governing the course:** G = Grade

G>=93	A
90<=G<93	A-
87<=G<90	B+
83<=G<87	B
80<=G<83	B-
77<=G<80	C+
73<=G<77	C
70<=G<73	C-
60<=G<70	D
G<60	F

- **Policy on late or missing work/exams:** All assignments, reports, and project deliverables have clearly defined deadlines (communicated through Canvas). Work submitted after the deadline without a substantiated and documented reason will not be accepted and will receive a grade of zero. Substantiated reasons include *documented medical emergencies*, *University-approved absences*, or other circumstances approved by the instructor in advance or as soon as reasonably possible. Partial credit is possible, so students are encouraged to submit their incomplete work for partial credit.
- **Repercussions for Academic Integrity violations:** Violations of academic integrity, including but not limited to *plagiarism*, *unauthorized collaboration*, *fabrication of data*, or *misuse of*

generative AI tools, will be handled in accordance with Saint Louis University's Academic Integrity Policy. Penalties may include a zero on the assignment, failure of the course, and/or referral to the University for further disciplinary action.

- **Penalties on missed classes and/or tardiness:** This class is project-based, therefore, regular attendance and active participation are required. Students are permitted **up to three excused absences**. More than three absences may result in a **failing grade** for the course. Chronic tardiness or disengagement during class and laboratory sessions may negatively impact the student's participation and overall course performance.

6. ATTENDANCE EXPECTATIONS

- Attendance and active participation are expected in all class and laboratory sessions due to the hands-on nature of the course.
- Absences (up to 3) must be **substantiated** and communicated to the instructor and their lab partners in advance. Students with substantiated absences may complete laboratory work on their own time, but must **coordinate** with their assigned lab partner to do so. Failure to properly coordinate with the lab partner may result in a grade of zero for the laboratory activity for that student.
- Unsubstantiated absences or failure to follow the coordination requirements will result in no credit for missed laboratory work.

7. COURSE SCHEDULE

It will be updated weekly in the sheet below:

https://docs.google.com/spreadsheets/d/1nzys97XmmDsQnvOBQCrkamUhQ7LE1fsxkN2k-5uXXiw/edit?usp=sharing

8. SAFETY & SECURITY PROTOCOLS

All students are expected to follow standard laboratory safety practices at all times, including proper use of equipment and adherence to any safety instructions provided during class.

Each laboratory group is responsible for the care, proper use, and return of their assigned hardware kits, including robot kits, microcontrollers, sensors, actuators, and related components. Kits must be kept intact and in good working condition. Loss of components, damage due to misuse, or failure to return equipment may result in academic penalties and/or financial responsibility.

Failure to follow safety procedures or equipment policies may result in removal from the laboratory and loss of credit for the associated activity.

9. POLICY ON COURSE RECORDINGS

Students are permitted to audio and video record class sessions for personal educational use or meeting assignment requirements. Recordings may not be shared, distributed, posted, or used for any purpose beyond individual study without explicit permission from the instructor.

UNIVERSITY POLICIES AND RESOURCES:

10. ACADEMIC INTEGRITY STATEMENT

Academic integrity is the commitment to and demonstration of honest and moral behavior in an academic setting. Since the mission of the University is "the pursuit of truth for the greater glory of God and for the service of humanity," acts of integrity are essential to its very reason for existence. Thus, the University regards academic integrity as a matter of serious importance. Academic integrity is the foundation of the academic assessment process, which in turn sustains the ability of the University to certify to the outside world the skills and attainments of its graduates. Adhering to the standards of academic integrity allows all members of the University to contribute to a just and equitable learning environment that cultivates moral character and self-respect. The full University-level Academic Integrity Policy can be found on the Provost's Office website at:

https://www.slu.edu/provost/policies/academic-and-course/academic-integrity-policy.pdf.

11. DISABILITY ACCOMMODATIONS STATEMENT

Students with a documented disability who wish to request academic accommodations must formally register their disability with the University. Once successfully registered, students also must notify their course instructor that they wish to use their approved accommodations in the course.

Please contact the Center for Accessibility and Disability Resources (CADR) to schedule an appointment to discuss accommodation requests and eligibility requirements. Most students on the St. Louis campus will contact CADR, located in the Student Success Center and available by email at accessibility_disability@slu.edu or by phone at 314.977.3484. Once approved, information about a student's eligibility for academic accommodations will be shared with course instructors by email from CADR and within Banner. Students who do not have a documented disability but who think they may have one also are encouraged to contact to CADR. Confidentiality will be observed in all inquiries.

12. TITLE IX STATEMENT

Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered any form of discrimination on the basis of sex, including sexual harassment, sexual assault, stalking, domestic or dating violence, we encourage you to report this to the University. If you speak with a faculty member about an incident that involves a Title IX matter, **that faculty member must notify SLU's Title IX Coordinator that you shared an experience relating to Title IX.** This is true even if you ask the faculty member not to disclose the incident. The Title IX Coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus.

If you are pregnant or experiencing a pregnancy related condition, the Title IX Coordinator can assist you in understanding your rights and options as well as provide supportive measures.

Anna Kratky is the Title IX Coordinator at Saint Louis University (DuBourg Hall, room 36; anna.kratky@slu.edu; 314-977-3886). If you wish to speak with a confidential source, you may contact the counselors at the University Counseling Center at 314-977-TALK or make an anonymous report through SLU's Integrity Hotline by calling 1-877-525-5669 or online at SLU.EDU/INTEGRITYHOTLINE. To

view SLU's policies, and for resources, please visit the following web addresses: https://www.slu.edu/about/safety/sexual-assault-resources/index.php.

13. GENERATIVE AI POLICY

Generative AI tools may be used in this course only as **a learning aid**, similar to a tutor or reference resource. Acceptable uses include *seeking conceptual explanations*, *debugging assistance when stuck on code*, or *improving grammar and clarity in writing*.

The use of generative AI to **fully** generate solutions, code, reports, or other submitted content is **not permitted**. Any use of generative AI must be **clearly disclosed** in the submitted work. Failure to disclose permitted AI use, or submission of AI-generated content as original work, will result in a grade of zero and may constitute a violation of academic integrity.

Learning to think through challenging problems is a core objective of this course. Like a muscle, the brain develops through effort and practice. Struggling with difficult concepts strengthens problem-solving ability through processes such as neuroplasticity. Relying on AI to replace independent thinking undermines this learning process and will negatively impact skill development in engineering design and programming.

14. ACADEMIC SUPPORT RESOURCES

Student Success Center

The Student Success Center (SSC) supports students in reaching their goals in and out of the classroom. Providing a variety of resources, the Student Success Center houses both the Center for Accessibility and Disability Resources (CADR) and Academic Support, which includes Tutoring, Supplemental Instruction, University Writing Services, and Student Success Coaching. The Student Success Center is located in the Busch Student Center, Suite 331, and students can make an appointment with any SSC resource via EAB Navigate. To learn more about the Student Success Center and its resources, please visit: https://www.slu.edu/life-at-slu/student-success-center/index.php.

University Writing Services

University Writing Services offers one-on-one consultations with trained writing consultants who help with everything from brainstorming, outlining, and proposing research questions to documenting sources, revising, and implementing feedback. These consultations are available to both graduate and undergraduate students and can take place in-person, asynchronously, or via Zoom. All appointments can be scheduled through EAB Navigate – Student. Getting feedback benefits writers at all skill levels on different writing projects (including but not limited to class assignments, conference papers, cover letters, dissertations, group projects, multimedia assignments, personal statements, senior capstone projects, short answer questions on applications, speeches, and theses). For additional information, visit https://www.slu.edu/life-at-slu/student-success-center/academic-support/university-writing-services/index.php or send an email to writing@slu.edu.

15. OTHER STUDENT SUPPORT RESOURCES

University Counseling Center Syllabus Statement

The University Counseling Center (UCC) offers free, short-term, solution-focused counseling to Saint Louis University undergraduate and graduate students. UCC counselors are highly trained clinicians who can assist with a variety of issues, such as adjustment to college life, troubling changes in mood, and chronic psychological conditions. To make an appointment for a wellness consultation, call 314-977-8255 (TALK), visit the UCC website or walk into the clinic on the second floor of Wuller Hall. For after-hours needs, please press #9 after dialing the clinic number and ask for a mental health specialist.

Wellness

With our Jesuit commitment to *cura personalis*, the University sees your academic success as connected to your health and well-being and provides resources to support your holistic wellness.

All students experience stressors and challenges at some point, and seeking support is both normal and beneficial. Such challenges may be the result of academic concerns (such as those related to particular assignments or content in a course), or they may be more personal in nature (such as concerns related to relationships, mental health, medical issues, loss, identities, alcohol or drugs, housing or food security, finances, or local/world events, among other things). If you experience these or other difficulties that are impacting your well-being and/or academic work, please consider seeking support from the resources available to you.

- For questions or concerns related to this course, please contact me. I am invested in your success and will support your success in the ways I can.
- Additionally, you have access to the many resources SLU provides in support of your personal wellness. You will find a list of available resources on the Well-being page of the SLU website.

If you or someone you know is experiencing a crisis: please consult Crisis Support and Warning Signs on the University Counseling Center website or call the University Counseling Center at 314-977-TALK (8255) and press #9 to be connected to a behavioral health nurse 24/7.

Basic Needs Security Syllabus Statement

Students experiencing food insecurity, housing insecurity, and any other challenges that are impacting their personal and/or academic wellbeing are encouraged to contact the Dean of Students Office for support. Students can submit an intake form, email deanofstudents@slu.edu, or call 314-977-9378 to connect with their office. Students may also communicate directly with their instructors about any challenges they are experiencing to receive support and resource referrals.