

**MENG 4350– Introduction to Mechatronics Course Syllabus**

Semester / Year	Spring 2022
Catalog Description	An introduction to Mechatronics and applications with overview of the key methods to design innovative mechatronic systems. Topics include: programming of microcontrollers, integration of electrical circuits and computers to control mechanical systems, and applications of mechatronics systems such as robotics and medical devices.
Prerequisites	MENG 3210, EENG 3308, and EENG 3301
Section number	TBA
Instructor name	Dr. Muath Bani Salim
Contact info	Office: RBN 3011, Phone: 903-565-6502, <a href="mailto:msalim@uttyler.edu">msalim@uttyler.edu</a>
Class Type / Location	Hybrid (f2f & Zoom). Location: RBN 3038.  Meeting ID: 973 3005 7906 Password: MENG4350
Class Time	Three hours a week 3:00 pm – 4:25 pm Mon-Wed
Office Hours	1:00 pm – 2:00 pm Mon-Wed 11:30 am – 12:30 pm Tue  Hybrid (f2f & Zoom). Location: RBN 3038  Meeting ID: 944 8735 3542 Passcode: mech
Credits	3 credits
Required Textbook & Tool kit	1. ELEGOO UNO Project Super Starter Kit with Tutorial and UNO R3 Compatible with Arduino IDE 2. M. Jouaneh, Fundamentals of Mechatronics. Cengage Learning, 2012.
Optional References	1. Arduino Programming: The Ultimate Intermediate Guide To Learn Arduino Programming Step By Step, by Ryan Turner 2. Visit: <a href="https://www.arduino.cc/">https://www.arduino.cc/</a> to download the open-source Arduino Software (IDE) 3. Visit <a href="http://www.tinkercad.com">www.tinkercad.com</a> to perform virtual simulation for Arduino board 4. Mechatronic, Electronic Control Systems in Mechanical and Electrical Engineering. W. Bolton, 7th Edition
Additional requirements	Students are expected to use their own individual laptops or compatible electronic devices. No computers will be provided by the department.
Evaluation Method	Course participation, Assignments, Quizzes, and Project

Grading Policy / Scale	<p>Final course grades will be based on:</p> <table border="0"> <tr> <td>Assignments</td> <td>35%</td> </tr> <tr> <td>Individual Project</td> <td>20%</td> </tr> <tr> <td>Group Project</td> <td>40%</td> </tr> <tr> <td>Participation</td> <td>5%</td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </table> <p><b>Scale:</b> A: 90 - 100, B: 80 – 89, C: 70-79, D: 60 – 69, F: &lt;60</p>	Assignments	35%	Individual Project	20%	Group Project	40%	Participation	5%	Total	100%
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Important events / dates	<p>Census date: Jan 24<sup>th</sup>, 2022          Project 1 due date: TBA          Project 2 due date: TBA</p>										
Attendance / Makeup policy	<p>Regular attendance is required. In case you must miss a class, it is your responsibility to keep up with the class work and be informed of all announcements made during the class.</p> <p><b>Assignments:</b> Assignments will be assigned according to the topics covered in lectures. Assignments are considered very important for the understanding of the course material. Completing your assignments independently is an absolute necessity to do well in this course. All assignments are due in one week.</p> <p><b>Canvas:</b> Course syllabus, course material such as handouts and example problems with solutions, homework, assignments, homework solutions, review material, exam solutions will all be posted on Canvas. Please review all the material posted on Canvas regularly.</p> <p><b>Project:</b> Individual project grades are calculated from the team project grade and peer evaluations, as well as instructor judgment and observations. Students are expected to make presentation after the completion of each project.</p>										
Course Learning Outcomes (CLO)	<p>By the end of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Students will be able to describe the basic components of mechatronic systems.</li> <li>2. Students will be able to identify and select the appropriate electric circuits and components for a particular mechatronic system.</li> <li>3. Students will be able to demonstrate the use of a microcontroller to enable integration of circuitry, sensors, and actuators in a mechatronic system</li> </ol>										

	<p>4. Students will be able to design and build a fully integrated mechatronic system to achieve specifically defined tasks.</p> <p>5. Students will be able to communicate effectively their engineering work in the form of professional technical documentation.</p>
Tentative Topics	See the two tables at the end of the syllabus
Other	N/A

**University, College, and Department Policies:**

**1. Modifications**

The instructor reserves the right to change this syllabus partially or fully at any point in time. Sufficient time and notice will be provided to the class before the activation of the changes.

**2. UT Tyler Honor Code**

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

**3. Student Standards of Academic Conduct**

Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, or material which has been submitted within a different course without explicit approval of the instructor, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

i. “Cheating” includes, but is not limited to:

- copying from another student’s test paper;
- using, during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;
- possession during a test of materials, or devices and instruments allowing access to materials, which are not authorized by the person giving the test, such as class notes or specifically designed “crib notes” as well as cell phones, to name a few. The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
- using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
- collaborating with or seeking aid from another student or person during a test or other assignment without explicit authorization;
- discussing the contents of an examination with another student who will take the examination;
- divulging the contents of an examination, for the purpose of preserving questions for use by another, or removing material from the exam location, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;

- substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
  - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
  - falsifying research data, laboratory reports, and/or other academic work offered for credit;
  - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
  - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.
- ii. “Plagiarism” includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another’s work and the submission of it as one’s own academic work offered for credit.
  - iii. “Collusion” includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.
  - iv. All written work that is submitted will be subject to review by plagiarism software.
  - v. Penalty for any related infractions will be decided at the discretion of the instructor including, but not limited to, granting of a failing grade in part or the course or in the entire course.

#### **4. Students Rights and Responsibilities**

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

#### **5. Important Covid-19 Information for Classrooms and Laboratories**

Students are expected to wear face masks covering their nose and mouth in public settings (including classrooms and laboratories). The UT Tyler community of Patriots views adoption of these practices consistent with its Honor Code (Links to an external site.) and a sign of good citizenship and respectful care of fellow classmates, faculty, and staff.

Students who are feeling ill or experiencing symptoms such as sneezing, coughing, digestive issues (e.g. nausea, diarrhea), or a higher than normal temperature should stay at home and are encouraged to use the UT Tyler COVID-19 Information and Procedures (Links to an external site.) website to review protocols, check symptoms, and report possible exposure. Students needing additional accommodations may contact the Office of Student Accessibility and Resources at University Center 3150, or call (903) 566-7079 or email [saroffice@uttyler.edu](mailto:saroffice@uttyler.edu)

#### **6. Recording of Class Sessions**

Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of

students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

### **7. Campus Carry**

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttlyer.edu/about/campus-carry/index.php>

### **8. UT Tyler a Tobacco-Free University**

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors.

Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless

tobacco, snuff, chewing tobacco, and all other tobacco products.

There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support.

For more information on cessation programs please visit [www.uttlyer.edu/tobacco-free](http://www.uttlyer.edu/tobacco-free).

### **9. Grade Replacement/Forgiveness and Census Date Policies**

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttlyer.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

### **10. State-Mandated Course Drop Policy**

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

### **11. Disability/Accessibility Services**

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.

The University of Texas at Tyler has a continuing commitment to providing reasonable accommodations for students with documented disabilities. Like so many things this Fall, the need for accommodations and the process for arranging them may be altered by the COVID-19 changes we are experiencing and the safety protocols currently in place. Students with disabilities who may need accommodation(s) in order to fully participate in this class are urged to contact the Student Accessibility and Resources Office (SAR) as soon as possible, to explore what arrangements need to be made to ensure access. During the Fall 2020 semester, SAR will be conducting all appointments via ZOOM. If you have a disability, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student Application. For more information, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices> or call 903.566.7079.

### **Student Absence due to Religious Observance**

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

### **12. Student Absence for University-Sponsored Events and Activities**

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

### **13. Social Security and FERPA Statement**

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

### **14. Emergency Exits and Evacuation**

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in

the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

**15. UT Tyler Resources for Students**

- UT Tyler Writing Center (903.565.5995), [writingcenter@uttyler.edu](mailto:writingcenter@uttyler.edu)
- UT Tyler Tutoring Center (903.565.5964), [tutoring@uttyler.edu](mailto:tutoring@uttyler.edu)
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)

**Table 2: List of Tentative Topics**

Week	Topic
1	<ul style="list-style-type: none"> <li>• Introducing mechatronics (Chapter 1)</li> </ul>
2	<ul style="list-style-type: none"> <li>• Sensors and signal conditioning (Chapter 7)</li> </ul>
3	<ul style="list-style-type: none"> <li>• Digital signals and Digital logic (Chapter 3)</li> </ul>
4	<ul style="list-style-type: none"> <li>• Arduino Board Programming (Chapter 4)</li> </ul>
5	<ul style="list-style-type: none"> <li>• Project 1 discussion</li> </ul>
6	<ul style="list-style-type: none"> <li>• Electrical actuation systems (Chapter 8)</li> <li>• Power electronics in mechatronic systems</li> </ul>
7	<ul style="list-style-type: none"> <li>• Measurement Systems in Mechatronics (Chapter 5 and MATLAB))</li> </ul>
8	<ul style="list-style-type: none"> <li>• Arduino Board Programming (Advanced applications) (Chapter 6)</li> </ul>
9	<ul style="list-style-type: none"> <li>• Project 2 discussion (Chapters 9&amp;10 and MATLAB)</li> </ul>
10	<ul style="list-style-type: none"> <li>• Mechatronics Applications in Mechanical Engineering (Lecture Notes)</li> </ul>
11	<ul style="list-style-type: none"> <li>• Internet of Things (IoT) (Lecture Notes)</li> </ul>
12	<ul style="list-style-type: none"> <li>• Mobile robots (Lecture Notes)</li> </ul>
13	<ul style="list-style-type: none"> <li>• Mechatronics in Industry (Lecture Notes)</li> <li>• Mechatronics Applications for Thermal systems (Lecture Notes)</li> </ul>
14	<ul style="list-style-type: none"> <li>• Final Projects Presentations</li> </ul>

15	<ul style="list-style-type: none"> <li>No final Exam</li> </ul>
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**Table 3: Course Calendar**

Month		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Jan 2022	Week 1	10 classes start	11	12	13	14	15	16
	Week 2	17 Martin Luther King, Jr. Holiday	18	19	20	21	22	23
	Week 3	24 Census Date	25	26	27	28	29	30
	Week 4	31	1	2	3	4	5	6
Feb 2022	Week 5	7	8	9	10 Individual Project Submission	11	12	13
	Week 6	14 Mid-Term Grade Rosters Open	15	16	17	18	19	20
	Week 7	21	22	23	24	25	26	27
	Week 8	28	1	2	3	4	5	6
Mar 2022		7 Spring break	8 Spring break	9 Spring break	10 Spring break	11 Spring break	12	13
	Week 9	14	15	16	17	18	19	20
	Week 10	21	22	23	24	25	26	27
	Week 11	28	29	30	31	1	2	3



Month		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Apr 2022	Week 12	4	5	6	7	8	9	10
	Week 13	11	12	13	14	15	16	17
	Week 14	18 Project Presentation	19	20 Project Presentation Last Class	21 Group Project Submission	22	23	24
	Week 15	25	26	27	28	29	30	1
May 2022		2	3 Final grades due	4	5	6	7 Spring Commencement	8
		9 Summer Classes begin	10	11	12	13	14	15
		16	17	18	19	20	21	22
		23	24	25	26	27	28	29
		30	31					