Course Title: Mechatronics MECH 4346, CRN: 21509
(Spring-2024): Credit: 3

Instructor: Arifur R. Khan, Ph.D. Assoc. Prof. AME (arkhan@utep.edu)
Office hours: TR; 12-1 pm (Eng. Build. A-317) or MS Team

TA: TBD

Class Schedule: UGLC, 216 MW 9:00-10:20 (Jan 16 to May 2, 2024)

Course Prerequisite: MECH 3345 with a C or better.

Course Description: Mechatronics requires knowledge of Sensors, Actuators, Circuits, Microcontrollers, and Programming to build and run a machine for a specific purpose. This type of understanding and experience are appropriate for Electrical, Mechanical, Control, Industrial, Computer, System, Spacecraft, and Aerospace Engineering students, etc.

Course Objective: This course educates students to be confident in mechanical systems with sensors and actuators powered by electrical and electronic systems controlled by computers (microprocessors) run by programming codes. At the end of this course, the typical student will understand how a machine works under different conditions for different purposes and will be able to design, implement, and build a Mechatronics system. This course will also improve the ability to identify, analyze, and solve engineering problems using basic science and engineering knowledge, human intuition, and instinct.

Course Topics:
- Introduction of Mechatronics
- Sensors, Transducers, Microcontroller and Data Acquisition
- Electric Actuators (Relay and Motors)
- System Model and Dynamic Response (Closed loop)
- Logic Gates, Digital Logic, and Programmable Logic Controller
- Hands-on Projects (will be assigned to each student team)
- Arduino/MATLAB/Simulink/App Design (Project related)

Reference:
3. Additional Reference materials (notes, projects, web links, etc.) may be handed out in class and available on Blackboard.

Software in class:
i-Clicker (Attendance, quiz, etc.), MATLAB, Arduino, LabVIEW

Student’s assessment:
1. Class Performance: 20% [Class quiz, Attendance and Attention]
2. Midterm-1: 20%
3. Midterm-2: 20%
4. Final Exam: 20% (OPTIONAL)
5. Project 40% (4 student team) [COURI: 10, Showcase poster: 10, Final project report (word. pdf.):15, Fina Project video: 5]
6. Final exam (Online, Bb) is optional. It will replace the worst midterm.
7. Grace point: 1% if it improves the current grade to the next better level.

Students grading:
A= ≥ 90%; B= < 90% and ≥ 80%; C= < 80% and ≥ 70%; D= < 70% and ≥ 60%; F= < 60% (UTEP Standard)

Tools in Class/Lab:
1. Scientific calculator, Laptop, Pad, and e-book can be used as problem-solving tools in class.
2. Project accessories (Arduino, components, etc.)
Necessary ITEMS

Depending on the project decided, students (in groups) should buy components, electronics, and necessary items to build (step by step) their final project.

Please note, University Name, Course Name and CRN, and Date
Link: https://app.reef-education.com/#/courses/add
Project Showcase: (40 points)

April 13, 2024: Time: from 8:30 am to 1 pm: Location TBD
Each group must display (poster and hands-on project) their project.

COURI Workshop

Preparing an abstract
From February 10, 2024 10:00 AM until February 10, 2024 12:00 PM
At SCALE-UP Innovation Space - CCSB G.0706A Categories: Creative Activity, Research, Campus Office of Undergraduate Research Initiatives (COURI), Professional Preparation Tags: UTEP Edge, Professional Development, Undergraduate Research, Workshop
Abstracts are short. Keep it brief but relevant. We will help you do that in this workshop.
REGISTRATION DEADLINE: FEB 8, 2024
IN-PERSON EVENT

Preparing a research poster
From March 23, 2024 10:00 AM until March 23, 2024 12:00 PM
At SCALE-UP Innovation Space - CCSB G.0706A Categories: Creative Activity, Research, Campus Office of Undergraduate Research Initiatives (COURI), Professional Preparation Tags: UTEP Edge, Professional Development, Undergraduate Research, Workshop
Research is meant to be shared. Posters are one of the most common ways you will share information about your project.
REGISTRATION DEADLINE: MAR 21, 2024
IN-PERSON EVENT

Midterm-1: (20 points)
February 26 (9 am to 10:50 am, Review Class)
Exam Date: February 26, Exam window: from 6 pm to 11:59 pm, Duration: 60 minutes.

Midterm-2: (20 points)
March 25 (9 am to 10:50 am, Review Class)
Exam Date: March 25, Exam window: from 6 pm to 11:59 pm, Duration: 60 minutes.

Final Exam (Optional, 20 points)
April 29 (9 am to 10:50 am, Review Class)
Exam Date: April 29, Exam window: from 6 pm to 11:59 pm, Duration: 60 minutes.
Grade Calculation (Example)

Class performance (20%): Iclicker Quiz, Attendance and Attention
   Points for each quiz: 1.5 (almost every class)
   Points for each attendance: 0.5 (almost every class)
   Student’s score (for example): \[
   \frac{72 (\text{Student score}) \times 20\%}{85 \text{ (out of total score)}} = 16.94\%
   \]

Midterm-1 (20%)= 19 (student’s score)/20 (out of total score)

Midterm-2 (20%)= 16 (student’s score)/20 (out of total score)

Project = 36 out of 40

Total Score without final exam:
   Class performance = 16.94 out of 20
   Midterm-1 = 18 out of 20
   Midterm-2 = 16 out of 20
   Projects = 36 out of 40
-------------------------------------------------------------------
   Total = 86.94 (87, Grade B)

If any student likes to improve the grade, it can be done by joining the final exam.

Score in the final exam (for example): 19 out of 20.

   Between the two midterms, the worst will be dropped or ignored if Final exam score is higher than any of the midterm scores. If not, final exam score will be ignored.

New score calculation

Total Score after final exam:
   Class performance = 16.94 out of 20
   Midterm-1 = 18 out of 20
   Midterm-2 = 16 out of 20 (dropped/ignored)
   Final exam: 19 out of 20
   Projects = 36 out of 40
-------------------------------------------------------------------
   Total = 89.94 (90, Grade A)
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 4th</td>
<td>Last Day to Clear Students on Suspension/Probation as well as those with Insufficient Prerequisites</td>
</tr>
<tr>
<td>Jan 5th</td>
<td>Drops for Students with Unsatisfactory Academic Standing, Insufficient Prerequisites, and Prior Grades of C in the Course</td>
</tr>
<tr>
<td>Jan 8th</td>
<td>Financial Aid is Disbursed</td>
</tr>
<tr>
<td>Jan 15th</td>
<td>Dr. Martin Luther King, Jr. Holiday – University Closed</td>
</tr>
<tr>
<td>Jan 16th</td>
<td>Spring classes begin</td>
</tr>
<tr>
<td>Jan 16th-19th</td>
<td>Late Registration (Fees are incurred)</td>
</tr>
<tr>
<td>Jan 31st</td>
<td>Spring Census Day</td>
</tr>
<tr>
<td>Feb 12th</td>
<td>Note: This is the last day to register for classes. Payments are due by 5:00 pm.</td>
</tr>
<tr>
<td>Feb 16th</td>
<td>20th Class Day</td>
</tr>
<tr>
<td>Mar 11th-15th</td>
<td>Graduation application deadline for degree conferral</td>
</tr>
<tr>
<td>Mar 20th</td>
<td>Spring Break</td>
</tr>
<tr>
<td>Mar 28th</td>
<td>Freshman midterm grades are due</td>
</tr>
<tr>
<td>Mar 29th</td>
<td>Spring Drop/Withdrawal Deadline</td>
</tr>
<tr>
<td>Mar 29th</td>
<td>Note: Student-initiated drops are permitted after this date, but the student is not guaranteed a grade of W. The faculty member of record will issue a grade of either W or F.</td>
</tr>
<tr>
<td>Apr 12th</td>
<td>Cesar Chavez Holiday - No classes; Spring Study Day</td>
</tr>
<tr>
<td>May 2nd</td>
<td>Deadline to submit candidates' names for commencement program</td>
</tr>
<tr>
<td>May 3rd</td>
<td>Spring – Last day of classes</td>
</tr>
<tr>
<td>May 5-10th</td>
<td>Dead day</td>
</tr>
<tr>
<td>May 11-12th</td>
<td>Spring Final Exams</td>
</tr>
<tr>
<td>May 15th</td>
<td>Spring Commencement</td>
</tr>
<tr>
<td>May 15th</td>
<td>Grades are Due</td>
</tr>
<tr>
<td>May 16th</td>
<td>Grades are posted to student records; students notified of grades and academic standing</td>
</tr>
<tr>
<td>Payment Deadlines</td>
<td>For more information on payment deadlines, visit the Student Business Services Website</td>
</tr>
</tbody>
</table>
Important Information

NETIQUETTE

As we know, sometimes communication online can be challenging. It’s possible to miscommunicate what we mean or to misunderstand what our classmates mean, given the lack of body language and immediate feedback. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action.

- Always consider the audience. This is a college-level course; therefore, all communication should reflect polite consideration of others’ ideas.
- Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- When reacting to someone else’s message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation.
- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

Class Attendance

The student is expected to attend all classes and laboratory sessions and attendance is mandatory for all freshman-level courses (1XXX). It is the responsibility of the student to inform each instructor of extended absences. When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor can drop the student from the class with a grade of W before the course drop deadline and with a grade of F after the course drop deadline.

Excused Absences for University-Recognized Activities

Students who will be absent while representing the University in officially recognized University activities (sports, band, professional conferences, etc.) must notify the Dean of Students not less than ten (10) days prior to the absence. The Dean of Students will provide the student with a letter of excuse for the professors. It is the student’s responsibility to give the letter to the professors prior to the official recognized activity. Students following these procedures will be permitted to make up both assignments and examinations in consultation with faculty.
EXCUSED ABSENCES AND/OR COURSE DROP POLICY

According to UTEP Curriculum and Classroom Policies, “When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class with a grade of “W” before the course drop deadline and with a grade of “F” after the course drop deadline.” See academic regulations in the UTEP Undergraduate Catalog for a list of excuse absences. Therefore, if I find that, due to non-
performance in the course, you are at risk of failing, I will drop you from the course. I will provide 24-hour advance notice via email.

OR

I will not drop you from the course. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the Registrar’s Office to initiate the drop process. If you do not, you risk receiving an “F” for the course.

MAKE-UP WORK

Make-up work will be given only in the case of a documented emergency. Note that makeup work may be in a different format than the original, require more intensive preparation, and may be graded with penalty points. If you miss an assignment and the reason is not considered excusable, you will receive a zero. It is, therefore, important to reach out to me—in advance if at all possible—and explain with proper documentation why you missed a given course requirement. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

ALTERNATIVE MEANS OF SUBMITTING WORK IN CASE OF TECHNICAL ISSUES

I suggest that you submit your work with plenty of time to spare if you have a technical issue with the course website, network, and/or your computer. I also suggest you save all your work (answers to discussion points, quizzes, exams, and essays) in a separate Word document as a backup. This way, you will have evidence that you completed the work and will not lose credit. If you are experiencing difficulties submitting your work through the course website, don't hesitate to contact the UTEP Help Desk. You can email me your backup document as a last resort.

INCOMPLETE GRADE POLICY

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

ACCOMMODATIONS POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services, and activities with documented disabilities to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodation will be made unless it is determined that doing so would cause undue hardship for the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the CASS portal.

SCHOLASTIC INTEGRITY

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as one’s
own. Collusion involves collaborating with another person to commit any academically dishonest act. Any academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit HOOP: Student Conduct and Discipline.

CLASS RECORDINGS

The use of recordings will enable you to have access to class lectures, group discussions, and so on in the event you miss a synchronous or in-person class meeting due to illness or other extenuating circumstances. Using such technology is governed by the Federal Educational Rights and Privacy Act (FERPA) and UTEP’s acceptable-use policy. A recording of class sessions will be kept and stored by UTEP following FERPA and UTEP policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. You may not share recordings outside of this course. Doing so may result in disciplinary action.

TEST PROCTORING SOFTWARE

Course assessments (the midterms and final exam) will use Respondus Lockdown Browser and Respondus Monitor inside Blackboard to promote academic integrity. You are encouraged to learn more about using these programs before the first test.

Please review the following guidelines:

- The assessments will only be available at the times identified on the course calendar.
- You may take the test at any time during the 24-hour window.
- A reliable Internet connection is essential to completing the exam. If you must go to a location to take the exam (such as the library), follow their health and safety requirements.
- You have 2 attempts to take the test. Once the window closes, your answers will be saved, and no changes can be made. The higher score will be recorded.
- Respondus Lockdown Browser will require that all internet tabs are closed before the start of the test.
- Respondus Monitor requires a webcam and microphone.
- You will be required to show your student ID to the webcam before the start of the test.
- Your face should be completely visible during the test. Blocking the camera will disable the test.
- No notes or textbook materials are permitted during the test. Respondus Monitor requires you to take a video of your surrounding area (desk, chair, walls, etc.)
- You should not converse with others and/or leave and return to the area during the test.

PLAGIARISM DETECTING SOFTWARE

Some of your coursework and assessments may be submitted to SafeAssign, a plagiarism-detecting software. SafeAssign is used to review assignment submissions for originality and will help you learn how to attribute sources rather than paraphrase properly.
COPYRIGHT STATEMENT FOR COURSE MATERIALS

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for this course. They may not be further disseminated.

COVID-19 PRECAUTIONS

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible so that we can work on appropriate accommodation. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu so that the Dean of Students Office can support and help communicate with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Centers for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can care for Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org

Course Resources: Where you can go for assistance.

UTEP provides a variety of student services and support:

Technology Resources
• **Help Desk**: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources
• **UTEP Library**: Access a wide range of resources, including online, full-text access to thousands of journals and eBooks, plus reference service and librarian assistance for enrolled students.
• **University Writing Center (UWC)**: Submit papers here for assistance with writing style and formatting, ask a tutor for help, and explore other writing resources.
• **Math Tutoring Center (MaRCS)**: Ask a tutor for help and explore other available math resources.
• **History Tutoring Center (HTC)**: Receive assistance with writing history papers, get help from a tutor, and explore other history resources.
• **RefWorks**: A bibliographic citation tool; check out the RefWorks tutorial, Fact Sheet, and Quick-Start Guide.

Individual Resources
• **Military Student Success Center**: Assists personnel in any branch of service to reach their educational goals.
• **Center for Accommodations and Support Services**: Assists students with ADA-related accommodations for coursework, housing, and internships.
• **Counseling and Psychological Services**: Provides various counseling services, including individual, couples, and group sessions and career and disability assessments.
The Discipline Process:

Academic Integrity Violations

If faculty member suspects scholastic dishonesty, s/he should follow the procedure outlined below:

- Faculty member refers incident to the Office of Student Conduct & Conflict Resolution
  - OSCCR staff confers with faculty member and student. OSCCR staff will investigate the matter further.
  - OSCCR staff may determine there is no finding of violation and dismiss the case
    OR determine information supports a finding of violation; student may choose not
    to dispute findings, waive hearing procedure, and accept an Administrative
    Disposition and sanction determined by OSCCR staff OR
  - Student may choose to dispute the findings and have matter resolved through a
    University Hearing

Administrative Disposition
- Within 14 days of accepting the Administrative Disposition, student may appeal, in writing, the
  sanction to the Office of the President
- Otherwise, the decision is final

University Hearing
- After hearing details related to the case, hearing officer may 1. dismiss the case, 2. uphold the decision, 3. find
  student responsible and impose higher sanction, or 4. find the student responsible and impose lesser sanction
- Within 14 days of decision, student may appeal the
  Hearing Officer's decision to the Office of the President

Appeal to Office of the President on
SANCTION ONLY
- Administration Disposition appeals are limited to the issue of sanction, University President may uphold,
  increase or lessen sanction.

Appeal to the Office of the President on
Both FINDINGS & SANCTION
- University President may reverse decision regarding findings OR
- Uphold decision regarding both findings and sanctions OR
- Uphold decision regarding findings, but increase or lessen sanction

Records kept on file in the Office of Student Conduct & Conflict Resolution

Addendum to Syllabi (Subject to Change)

Class Attendance Policy

Attendance is mandatory. **Anyone with 5 or more absences will be dropped from the class.** A drop for not attending will count toward the State Allowed Six Drop Limit. If you fail the class at the time of the drop, you may also be given a WF designation. A drop could adversely impact visa status, financial aid, and other programs.

As per UTEP rules, you may be asked to show a UTEP ID anytime during class. Anyone present and not registered in the class will be subject to disciplinary action unless the instructor gives prior approval.

Directions for Filing a Student Grievance

**The University of Texas at El Paso**

(Last Revised August 2020)

The following is a summary of what you must do before filing a grade complaint with the Student Grievance Committee.

A challenge to a grade may be pursued only on the basis of:

1. **Malice**: The intent, without cause or reason, to commit a wrongful act that will result in harm to another.
2. **Bias**: An unfair act or policy stemming from prejudice.
3. **Arbitrariness**: Being determined by chance, inadvertent score or grade mistakes, whim, or impulse, and not by necessity, reason, or principle.
4. **Negligent Determination of a Grade**: An impulsive change of mind or a sudden unpredictable action, change, or series of actions or changes.
5. **Impermissible Discrimination**: Not permitted treatment or consideration based on class or category rather than individual merit.

You will be asked to provide evidence that supports your claim of malice, bias, arbitrariness, negligent determination, or impermissible discrimination.

Examples of evidence include your grades along with the course syllabus and course policies that show you were not graded according to what was stated in those documents.

All grade complaints must be filed within one year after the final grade has been issued in the course. For a student who has graduated, the filing deadline is three months following the semester in which the degree was awarded.

Prior to filing a complaint, you must complete the following steps:

A. Meet directly with the faculty member who issued the grade and discuss your concern.

B. If you are unable to resolve the difference, it is encouraged that you seek assistance from the Department Chair or other appropriate academic administrator in attempts to resolve the grading dispute.

After you have completed the above steps and are still unable to resolve the situation, you should prepare and submit the online complaint form.

Class quiz retaken policy

Missing class quizzes and attendance can be retaken if it is a **UTEP-approved absence** (Seminar, Sports, COVID-19 or physical illness with medical proof, etc.)

Phone and personal computer usage in the classroom

**Students should only use a phone or personal computer if it is asked (by the professor) to use it.** It can be used during the i-clicker quiz or solving numerical problems. If it is used without the permission of the professor or TA, the **first warning** will be given by Oral or Email notification, the **second warning** will deduct 5 points, and the **last (the 3rd) warning** will curtail 10 points from the class performance.

Excused Absence for Exams

The UTEP catalog allows Exam Absence to be excused ONLY for University-Recognized Activities and specific situations. **Medical absence is NOT allowed in the UTEP catalog.** For consistency with the catalog, students will NOT be excused from exams due to illness.

Harassment Policy

The University (see Handbook of Operating Procedures 1.2.2.4) has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

- **Repeated emails and/or calls** regarding subjects that have already been addressed. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment, but repeated questions about a grade or an administrative decision are.

- **Grades are NOT negotiable,** ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation NOT based on a mistake is considered harassment and will be reported immediately.

- **Remaining in an office after the occupant requests you leave is considered harassment and potentially threatening.** You will be reported immediately without warning and, depending on the severity, may be reported to law enforcement.

Similar behavior towards department staff and student advisors will also be treated as harassment, including persistent phone calls, emails, and badgering. Department staff and student advisors are there to help students and should be treated with due respect.