1 Course Number and Name
   a. MENR 4351: Mechatronic System Design, Fall 2021
   b. Lecture: Sec 010 1:00 pm - 2:50 pm, Monday
      Lab: Sec 01Z 1:00 pm - 2:50 pm, Wednesday

2 Credits and Contact Hours
   a. Credits: 3
   b. Contact Hours: 2 hours/week (Classroom) 2 hour/week (Lab)

3 Instructor Information
   a. Course Coordinator: Armita Hamidi
   b. Instructor: Armita Hamidi, 325-486-5518, armita.hamidi@angelo.edu, Office: VIN 272. For
      office hours see faculty homepage.

4 Required Course Materials
   a. Textbook: Readings and course materials will be posted on-line. You do not need to purchase a
textbook.
      The recommended book for this course which can be used as a reference is:
      Carryer, J.E., Ohline, R.M. and Kenny, T.W., 2011. Introduction to mechatronic design.
   b. Lab Manual: Mechatronic systems lab manual will be provided on Blackboard for each lab
      session.
   c. Other supplemental materials posted on Blackboard® Learning Management System.

5 Technology Requirements
   a. This requires internet access and the ability to use the following online tools: Blackboard,
      Gradescope, Blackboard Collaborate, Adobe Acrobat (or another pdf maker), YouTube. No
      specific hardware is required, but access to a computer with webcam is highly encouraged.
   b. For secure online testing, you need to install Respondus and Respondus LockDown Browser and
      require a webcam. You can find the instruction on how to download and use the is provided at
   c. Software requirements:
      • Microsoft Office: You can access Word, Excel, PowerPoint with your ASU email. Angelo
      State has partnered with Microsoft to make Office 365 available to students.
      • CAD software: You need to access CAD software to prepare designs for the Labs and
      projects. You can use any CAD software such as Solidworks, Creo, Autodesk Inventor, etc.

6 Specific Course Information
   a. Catalog Description: Solutions to mechanical engineering problems through the synthesis
      of data acquisition systems, sensors, transducers, actuators, software platforms,
      mechanical and electrical components, numerical resources, process flow. An emphasis
      upon the use of programmable logic controllers with control theory and application to
      achieve desired system performance.
   c. Prerequisites: MENG 3351, and either ENGR 2304 or CS 1314 or 1336.
   b. Required or Elective Course: Technical elective for the BSME Major.
7 Specific Goals for the Course

a. Course Learning Outcomes:
   1. Describe mechatronic systems and understand the function and application of mechatronic systems components (e.g., sensors, actuators, microprocessors, etc.).
   2. Describe electrical/electronic circuits and components as they apply to mechatronic systems.
   3. Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.
   4. Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course.
   5. Acquire the skills necessary to design a mechatronic device, including the ability to select components and integrate them into a working prototype.

b. Course Learning Outcome Mapping to ABET Criterion 3 Student Outcomes:

Table 1: Course Learning Outcomes mapped to ABET Student Outcomes

<table>
<thead>
<tr>
<th>ABET Student Outcomes</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Solve Problems</td>
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<td>X</td>
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<tr>
<td>2. Design</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>3. Communication</td>
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<td>4. Ethics &amp; Professionalism</td>
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<tr>
<td>5. Teamwork</td>
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<tr>
<td>6. Experimentation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7. Acquire New Knowledge</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

8 Topics Covered

1. Introduction
2. Circuits and electrical components
3. Microcontroller fundamentals
4. Motors and servos
5. Sensors and microcontroller interfacing
6. Building mechatronic systems
9 Course Delivery and Communications

9.1 Delivery Method
This is a face-to-face course with learning resources and supplemental materials posted in Blackboard. Accommodations will be made for students who are in quarantine or isolation and are unable to attend.

9.2 Communications
You may communicate with me via Blackboard discussion board, email, phone, or via GroupMe text. I will respond to email or telephone messages within 24 hours during working hours Monday through Friday. Weekend messages may not be returned until Monday.

Written communication via email: All private communication will be done exclusively through your ASU email address. Check frequently for announcements and policy changes. In your emails to faculty, include the course name and section number in your subject line.

Office hours or advising may be arranged with the assistance of Collaborate, Zoom, or another web meeting platform.

10 Professionalism
Professional engineering standards apply in this class. You are expected to demonstrate a behavior consistent with the conduct of an individual practicing in the engineering profession. You are expected to: (1) come prepared for class; (2) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) demonstrate sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accept constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; (7) be punctual to class meetings; (8) maintain a good work ethic and integrity; and (9) recognize the classroom as a professional workplace.

11 Graded Material

11.1 Class Attendance, Participation, Timeliness and Teamwork
The number one complaint of engineering clients is the timeliness of deliverables (reports, drawings, specifications, etc.). As a professional engineer you will be expected to arrive at scheduled meetings on time and prepared. Late proposals are not generally accepted. Late specifications or drawings may cost the engineer a monetary penalty. Professional engineering standards apply in this course.

You are expected to meet every class meeting on time and prepared. Attendance will be taken. Should you find it necessary to miss a class for any reason, you are expected to notify your instructor as early as the absence is known—preferably before the absence. It’s important that you communicate clearly your instructors.

Your online assignments, lab reports and project submission will be due at the time specified on Blackboard. Any assignments submitted in hard copy are due at the beginning of class on the due date. Your instructor may assess penalties for late work.

11.2 Quizzes
There may be in-class quizzes. The quizzes will be unannounced and unscheduled. The quizzes are intended to determine whether or not you have completed the pre-class work and are prepared for class.
11.3 Reading Assignments and homework

You will be given reading and homework assignments nearly every lesson. Reading assignments will come from the assigned textbooks or other materials provided or available via the web. The homework assignments will consist of questions to be answered during your reading and preparation for class. Reading and homework assignments will be distributed via the Blackboard.

11.4 Lab Experiments

Participation in Lab sessions expected from all students. Zero points will be awarded for missed lab sessions. These lab experiments cannot be made up.

11.5 Projects

This is project-based class. There will be several projects for this class requiring some hands-on experiments. The projects will involve building circuits and programming electronic components. The final project is design and develop a mechatronic system using methods and components described during the class.

11.6 Exams

There will be three exams during the semester and a final exam at the end of the semester.

11.7 Grades: Weighting and Letter Grades

The weighting system shown in Table 2 will be used in determining final grade for the course.

Table 2: Grade Weighting

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Labs</td>
<td>30%</td>
</tr>
<tr>
<td>Project</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>10%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>10%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>10%</td>
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<tr>
<td>Final Exam</td>
<td>10%</td>
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<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Include some translation between percent and letter grades. You can use a specific percent or use a general description as below.

The instructor will determine letter grades for the course using his professional judgment, and the following standards as described in the University Catalog:

A = excellent work       B = good work       C = average work       D = poor work       F = failing work
11.8 Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 Grading Procedures for more information.

12 Classroom and University Policies and Student Support

All students are required to follow the policies and procedures presented in the Angelo State University Student Handbook and Angelo State University Catalog.

12.1 Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAA/AAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student’s responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the Student Disability Services website. The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dr. Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
325-942-2047
dallas.swafford@angelo.edu
Houston Harte University Center, Room 112

12.2 Title IX at Angelo State University

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Miller, J.D. You may submit reports in the following manner:

Online: Incident Reporting Form
Face to Face: Mayer Administration Building, Room 210
Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State’s policy please visit the Title IX website.¹\n
### 12.3 Student Absence for Observance of Religious Holy Days

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day⁸ for more information.

### 12.4 Information About COVID-19

Please refer to ASU’s COVID-19 (Coronavirus) Updates⁹ web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

### 12.5 Student Conduct Policies

#### 12.5.1 Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

#### 12.5.2 Plagiarism

Plagiarism is a serious topic covered in ASU’s Academic Integrity policy¹⁰ in the Student Handbook. Plagiarism is the action or practice of taking someone else’s work, idea, etc., and passing it off as one’s own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality via Turnitin or SafeAssign. Resources to help you understand this policy better are available at the ASU Writing Center¹¹.

#### 12.5.3 Copyright Policy

Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

### 13 Course Outline

The lecture lesson outline is presented in Table 3. Detailed reading and homework assignments along with updates to this schedule will be provided via Bb. The schedules may be modified as the semester progresses.
<table>
<thead>
<tr>
<th>week #</th>
<th>Module #</th>
<th>Date</th>
<th>Topic</th>
<th>Assignments</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>23-Aug</td>
<td>Introduction to Mechatronics</td>
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<tr>
<td></td>
<td></td>
<td>25-Aug</td>
<td>Introduction to Mechatronics</td>
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<td>2</td>
<td>2</td>
<td>30-Aug</td>
<td>Electronics: Circuits and Electrical components</td>
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<td>1-Sep</td>
<td>Lab 0- Introduction &amp; safety review</td>
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<td>3</td>
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<td>6-Sep</td>
<td>Labor Day Holiday</td>
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<td>13-Sep</td>
<td>Electronics: Circuits and Electrical components</td>
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<td>Lab 1</td>
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<td>20-Sep</td>
<td>Electronics: Circuits and Electrical components</td>
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<td>22-Sep</td>
<td>Lab 2</td>
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<td>Electronics: Circuits and Electrical components</td>
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<td>29-Sep</td>
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<td>4-Oct</td>
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<td>6</td>
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<td>6-Oct</td>
<td>Micro</td>
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<td>Lab 4</td>
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<td>13-Oct</td>
<td>Micro</td>
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<td>20-Oct</td>
<td>Micro</td>
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<td>Actuators</td>
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<td>8-Nov</td>
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<td>Sensors</td>
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<td>15-Nov</td>
<td>Lab 7</td>
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<td>17-Nov</td>
<td>Sensors</td>
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<td>22-Nov</td>
<td>Exam 4</td>
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<td>24-Nov</td>
<td>Spring Break Holiday</td>
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<td>12</td>
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<td>29-Nov</td>
<td>Project presentations</td>
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End Notes

1 angelo.blackboard.com
2 https://www.angelo.edu/content/files/14197-op-1011-grading-procedures
3 http://www.angelo.edu/student-handbook/
4 https://www.angelo.edu/academics/catalog/
5 https://www.angelo.edu/current-students/disability-services/
6 https://www.angelo.edu/incident-form
7 https://www.angelo.edu/title-ix
8 http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of
9 https://www.angelo.edu/covid-19/
10 http://www.angelo.edu/student-handbook/community-policies/academic-integrity.php
11 http://www.angelo.edu/dept/writing_center/academic_honesty.php