1 Course Number and Name
   a. MENG 3352: Computer Aided Engineering, Spring 2020
   b. Section 010, M 3:00 – 4:50 am, Lab R 9:30 –12:20

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

3 Instructor Information
   a. Course Coordinator: Manuel García
   b. Instructor: Manuel García, 325-486-5515, manuel.garcia@angelo.edu. Office: VIN 274. For office hours see faculty homepage.

4 Required Course Materials

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. The required software is installed in the VDI server. That includes Anaconda Python, Autodesk Inventor, Autodesk Fusion and Autodesk CFD. You can also install that software in your personal computer.
   b. Squarecap is a web-based classroom response application that your instructor will be using during your course for in-class Q&A and verifying your attendance. Use any Wi-Fi capable device (connect to classroom Wi-Fi network preferably) and visit: www.squarecap.com on your web browser and use your ASU email

6 Specific Course Information
   a. Catalog Description: Use of software platforms for the analysis of engineering systems. Computer programing including data structures and uses of scientific libraries. An introduction to finite element analysis and numerical methods for the solution of structural, fluid and thermal problems. LabView/arduino programming with an emphasis on data acquisition.
   b. Prerequisites and Corequisites: Prerequisites: MATH 3324, and either ENGR 2304 or Computer Science 1314 or 1336.
   c. Required or Elective: Required (Engineering principles)
7 Specific Goals for the Course

a. Course Learning Outcomes:
   1. Apply fundamental programming concepts, using python programming language, to solve engineering problems
   2. Develop, understand, test, and evolve substantial programs using a modern IDE, and associated configuration tools;
   3. To define the structure and components of a Python program.
   4. To learn how to write functions, pass arguments and read/write files in Python.
   5. Develop an understanding of basic knowledge of analytical tools related to finite element methods
   6. To apply finite element methods to model engineering structure problems
   7. Identify the purpose of using FEA in the design process
   8. Identify and avoid errors inherent to FEA results
   9. Identify FEA advantages and shortcomings
   10. Recognize and avoid common FEA mistakes and produce reliable results.
   11. Interpret and use FEA results

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

   Table 1 Course Learning Outcomes mapped to ABET Students Outcomes

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

1. Use of python software platforms for the analysis of engineering systems.
2. Python basic concepts, variables and objects, arrays, plotting, symbolic computations
3. Basic Constructions, conditionals, indentation, functions, cycles, lists, tuples, arrays and plotting.
5. Arduino programming with an emphasis on data acquisition.
6. Finite Element Analysis best practices for structural and Fluid problems
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 Evaluation
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. Squarecap will be used to register your attendance.

All significant engineering projects are completed by teams. You will be assigned to a team for most labs. The purpose of the teams are to give you practice working together and to provide a support group for you within the class. Outside of class, please collaborate and work with anyone you wish.

Table 2 presents the grade weighting

<table>
<thead>
<tr>
<th>Table 2: Grade Weighting</th>
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<tbody>
<tr>
<td>Assessment</td>
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<tr>
<td>Homework</td>
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<td>Quizzes</td>
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<td>Project 1</td>
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<tr>
<td>Project 2</td>
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<tr>
<td>Final Project</td>
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<tr>
<td>Total</td>
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</table>
11.1 **Homework**

Homework will be initiated at the Laboratory session and will be based on the previous week’s lecture topics. They are due a week after on the Lab session. Programs will be graded based on functionality (it accomplish the task), organization, use of mnemonic names for the variables, inclusion of comments in the code.

11.2 **Quizzes**

There will be in-class quizzes. The quizzes will be unannounced and unscheduled. The quizzes are intended to determine whether or not you are understanding the concepts exposed in class and also will serve to verify that you have completed homework assignment.

11.3 **Project**

There will be three projects in the course. The first one covers python programming, the second programming of a finite element analysis, and the third one uses commercial simulation programs like Autodesk Nastran, Fusion 30 and Autodesk CFD.

11.4 **Grades**

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

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Number Grade</th>
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<tbody>
<tr>
<td>A</td>
<td>≥ 90</td>
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<tr>
<td>B</td>
<td>[80 – 90]</td>
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<tr>
<td>C</td>
<td>[70 – 80]</td>
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<tr>
<td>D</td>
<td>[60 – 70]</td>
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<tr>
<td>F</td>
<td>&lt; 60</td>
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</tbody>
</table>

11.5 **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 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 (ADAAA) 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:

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
Phone: 325-942-2022
Email: michelle.miller@angelo.edu

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.

12.3 Observance of Religious Holy Day

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 Day for more information.
12.4 Information About COVID-19
Please refer to ASU’s COVID-19 (Coronavirus) Updates 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. The College of Science and Engineering adheres to the university’s Statement of Academic Integrity.

12.5.2 Plagiarism
Plagiarism is a serious topic covered in ASU’s Academic Integrity policy 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. Resources to help you understand this policy better are available at the ASU Writing Center.

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 course outline is presented in Table 4. Detailed reading and homework assignments along with updates to this schedule will be provided via Bb. The following schedule may be modified as the semester progresses.

Table 4: Course Lecture Schedules

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23, 26 Aug</td>
<td>Introduction to Python</td>
<td>1.1-1.4</td>
</tr>
<tr>
<td>2</td>
<td>30 Aug, 2 Sept</td>
<td>symbolic computations</td>
<td>1.5</td>
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<tr>
<td>3</td>
<td>6, 9</td>
<td>If test, Functions, loops</td>
<td>2.1, 2.3, 2.4</td>
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<tr>
<td>4</td>
<td>13, 16</td>
<td>lists and tuples, Writing files</td>
<td>2.5, 2.6</td>
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<td>5</td>
<td>20, 23</td>
<td>Computing Integrals</td>
<td>3.1, 3.2, 3.3, 3.4</td>
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<tr>
<td>6</td>
<td>27, 30</td>
<td>Solving ODE</td>
<td>4.1</td>
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<td>7</td>
<td>4, 7 Oct</td>
<td>FEM 1D</td>
<td>Notes</td>
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<td>8</td>
<td>11, 14</td>
<td>FEM 1D</td>
<td>Notes</td>
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<tr>
<td>9</td>
<td>18, 21</td>
<td>Concepts of FEA</td>
<td>Ch1, ch2</td>
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<td>10</td>
<td>25, 28</td>
<td>Discretization Errors</td>
<td>Ch4</td>
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<td>11</td>
<td>1, 4 Nov</td>
<td>Finite Element mesh and modeling process</td>
<td>Ch5, ch6</td>
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<tr>
<td>Week</td>
<td>Date</td>
<td>Topic</td>
<td>Reading</td>
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<tr>
<td>12</td>
<td>8, 11</td>
<td>Nonlinear geometry and material analysis</td>
<td>Notes</td>
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<tr>
<td>13</td>
<td>15, 18</td>
<td>Computational Fluid Dynamics</td>
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<td>14</td>
<td>22, 25</td>
<td>CFD</td>
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<tr>
<td>15</td>
<td>29 Nov, 2 Dec</td>
<td>Project Presentations</td>
<td></td>
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</tbody>
</table>

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 http://www.angelo.edu/catalogs/
5 http://www.angelo.edu/services/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