1. Course Number and Name
   a. **ENGR 3305**: Probability and Risk in Engineering, Summer 2020
   b. Section DM1, Online

2. Credits and Contact Hours
   a. Credits: 3

3. Instructor Information
   a. **Course Coordinator**: Manuel García
   b. **Instructor**: Manuel García, 325-486-5515, manuel.garcia@angelo.edu. Office: VIN 273. For office hours see faculty homepage.

4. Course Materials
   a. **Required Textbook**:
   b. **Software**
      - *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, visit [http://www.squarecap.com](http://www.squarecap.com) on your web browser
      - **Python**. Installed in the Virtual Server.
      - **DataCamp**. [https://www.datacamp.com/groups/shared_links/0dfe18c7ae53938aee12c18aba31b0f983824c6939840a77d79cbad33b2eac30](https://www.datacamp.com/groups/shared_links/0dfe18c7ae53938aee12c18aba31b0f983824c6939840a77d79cbad33b2eac30)
   c. **Other Supplemental Materials**:Posted on Blackboard® Learning Management System

5. Specific Course Information
   a. **Catalog Description**: Modeling of random processes in engineering design and decision making. Fundamentals of probability spaces; random variables; dependence and independence; mean values and moments. Development of mathematical and simulation models, and their relevance to engineering design and decision making.
   b. **Prerequisites and Corequisites**: Prerequisite: MATH 3415
   c. **Required or Elective**: Required (Engineering principles)

6. Specific Goals for the Course
   a. Course Learning Outcomes:
      1. Describe uncertainty, randomness, and imperfect knowledge; and describe applications of decision making in various disciplines within civil engineering;
      2. Identify probabilistic events, and calculate the probability of those events using various mathematical tools;
      3. Analyze, construct, and communicate probability of outcomes using various mathematical tools;
      4. Describe and construct probabilities based on multiple, dependent variables;
5. Utilize numerical and simulation methods in software programs (e.g. MS Excel, MATLAB) to solve complicated probability scenarios;
6. Analyze probabilistic distributions and formulate engineering recommendations with known levels of confidence and risk;
7. Analyze sociotechnical probabilistic situations (including impacts of engineering solutions in global, economic, environmental, and societal contexts) and justify recommendations with known levels of confidence and risk.

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

7. Topics Covered

1. Sampling and Descriptive Statistics
2. Probability, Conditional Probability, and Events Space
3. Probability Distribution Functions
4. Propagation of Error
5. Hypothesis Testing and Confidence Intervals
6. Correlation and Regression Analysis
7. Quality Assurance/ Control Charts
8. Special Topics: Programming and Statistical Projects
8. 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>Assessment</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readings</td>
<td>10</td>
</tr>
<tr>
<td>Homework</td>
<td>25</td>
</tr>
<tr>
<td>Quizzes</td>
<td>5</td>
</tr>
<tr>
<td>Exams</td>
<td>30</td>
</tr>
<tr>
<td>Projects</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

8.1 Readings

Readings will be set up using McGraw-Hill Connect are due daily to guaranty your continuous engagement. Check Blackboard for specific due dates.

8.2 Homework

Problem sets will be due weekly and will be based on the previous week’s lecture topics. Check Blackboard for specific due dates.

8.2.1 Quizzes

Weekly meetings will be held online at a concerted time. During that time questions will be ask to determine whether or not you are understanding the concepts exposed in the course.

8.3 Exams

Exams will be either online or on paper. Please verify that you are able to print and scan to a PDF format They will be open textbook or notes. Details will be discussed closer to the exam time.

8.4 Project

There will be several small projects in which you will apply the concepts acquired and use computational tools to analyze data.

8.5 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 3: Grading Scale

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

9. Classroom and University Policies and Student Support

9.1 General Policies

All students are required to follow the policies and procedures presented in the Angelo State University Student Handbook¹ and Angelo State University Catalog².

9.2 Student Disability Services

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 website³. 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

9.3 Title IX at Angelo State University

The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Boone, J.D.  
Director of Title IX Compliance/Title IX Coordinator

ENGR 3305-4
Face to face: Mayer Administration Building, Room 210
325-942-2022, michelle.boone@angelo.edu

You may also file a report online 24/7 at www.angelo.edu/incident-form.

If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

For more information about Title IX in general you may visit www.angelo.edu/title-ix.

9.4 **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.

9.5 **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 Grading Procedures for more information.

9.6 **Student Conduct Policies**

9.6.1 **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.

9.6.2 **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.

9.6.3 **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.

10. **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>W</th>
<th>Date</th>
<th>Topic</th>
<th>Book Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jun 1-5</td>
<td>Sampling and Descriptive statistics</td>
<td>1.1-3, 2.1</td>
</tr>
<tr>
<td>2</td>
<td>Jun 8-12</td>
<td>Probability</td>
<td>2.1, 2.1, 2.3, 2.4</td>
</tr>
<tr>
<td>3</td>
<td>Jun 15-19</td>
<td>Probability Exam Part 1</td>
<td>2.5, 2.6</td>
</tr>
<tr>
<td>4</td>
<td>Jun 22-26</td>
<td>Propagation of Errors</td>
<td>3.1, 3.2, 4.1, 4.2, 4.3, 4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Probability Distributions</td>
<td></td>
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<tr>
<td>5</td>
<td>Jun 29 – July 2</td>
<td>Probability Distributions</td>
<td>4.6, 4.11, 5.1, 5.2, 5.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confidence intervals</td>
<td></td>
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<tr>
<td>6</td>
<td>July 6-10</td>
<td>Hypothesis Testing</td>
<td>6.1, 6.2, 7.1</td>
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<tr>
<td></td>
<td></td>
<td>Correlation</td>
<td></td>
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<tr>
<td>7</td>
<td>July 13-17</td>
<td>Correlation</td>
<td>7.2, 10.1, 10.2, 10.3</td>
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<td>Quality Control</td>
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<tr>
<td>8</td>
<td>July 20-24</td>
<td>Student project Presentations</td>
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</tr>
</tbody>
</table>

End Notes

6. http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of