ENGR 3404L: Introduction to Fluid Mechanics Laboratory

1. Course Logistics
   - Semester: Fall 2020 Sections 01Z & 02Z
   - Class Days: Wednesdays and Fridays
   - Class Time: Wednesdays 3:00 PM – 5:50 PM (Section 01Z)
   - Class Time: Fridays 10.00 AM – 12.50 PM (section 02Z)
   - Location: Hunter Strain 103

2. Instructor Information
   - Instructor: Mohammad Shafinul Haque, PhD
   - Email: mhaque@angelo.edu
   - Phone: (325) 486-5509
   - Office: VIN 281
   - Office Hours: Posted on Dr. Haque’s ASU Faculty Website

3. Required Materials
   - Series of Lab handouts, video and other information posted on the course Blackboard page

4. Prerequisites
   - ENGR 2302; Civil/Mechanical Engineering Majors only, or Departmental permission

5. Course Description
   In the laboratory component of the course you will observe, measure and perform experiments related to principles of fluid mechanics and hydraulics. Topics covered include of fluid properties, hydrostatics, conservation of energy and momentum, flow measurement, and viscous flow in pipes.

6. Student Learning Outcomes
   When you complete this course laboratory, you should be able to:
   1. conduct appropriate experimentation, analyze and interpret experimental data in topics of fluid properties, hydrostatics, flow measurement, and viscous flow in pipes.
   2. design a simple hydraulic system to meet desired needs with physical, economic and manufacturability constraints;
   3. present and support project recommendations in oral and written forms.

7. Course Outcome Mapping
   The mapping of the Student Learning Outcomes for the course to the ABET Criterion 3 Student Outcomes is shown in Table 1.
### Table 1: Student Learning Outcome Mapping to ABET Criterion 3

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

#### 8. Laboratory Structure, Communication, and Policies

The fluid mechanics laboratory will meet once a week for a three-hour session. Experimental and Project materials will be organized on the Blackboard website for the lab section, which constitutes the main mean of communication between the instructor and students. The lab policies are as follows:

1. You are expected to read the experimental procedures and **must watch the videos** in advance of the experiment. Laboratory material will be posted on blackboard in advance for you to review.

2. A short quiz may be given at the beginning of each session. The quiz will cover the experiment to be conducted that day and the previous laboratory assignment.

3. During the laboratory periods you will not be assigned specific tasks, but you will be expected to participate as a team member. Cleanup at the end of each laboratory period is part of the assigned tasks.

4. Follow all safety instructions given during the laboratory sessions.

5. You must attend each session and prepare a written report as a team for every experiment unless stated otherwise. All laboratory assignments must be completed to pass the course.

6. Each team must prepare their own report, teams submitting identical or very similar reports, even only for a portion of it, will receive a zero grade and may be subject to academic suspension.

7. If you miss a laboratory section due to unforeseeable circumstances, contact your respective instructor at soon as possible. Make-up participation or quizzes will only be allowed under extenuating circumstances.

#### 9. Professionalism

Professional engineering standard 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 laboratory as a professional workplace.
10. Graded Material

The grading apportioning of the laboratory is divided as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory short quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Self + Peer Lab Activity Evaluation</td>
<td>10%</td>
</tr>
<tr>
<td>Laboratory reports</td>
<td>80%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The laboratory grade will count as 14% of total ENGR 3404 course grade. The fountain project will count as 10% of total course grade.

The grade weighing for the lab reports is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction and Objectives</td>
<td>20%</td>
</tr>
<tr>
<td>Experimental Procedures</td>
<td>20%</td>
</tr>
<tr>
<td>Results and Discussion</td>
<td>30%</td>
</tr>
<tr>
<td>Conclusion</td>
<td>10%</td>
</tr>
<tr>
<td>Sample Calculations</td>
<td>10%</td>
</tr>
<tr>
<td>Professionalism</td>
<td>10%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

11. Laboratory Reports

All laboratory sessions require a high quality written report unless specified otherwise by the instructor. All lab assignments are due at the beginning of the following lab session. Laboratory reports should be simple, organized, and clearly communicate the ideas to the reader. The report should be free of spelling and grammatical errors. Sloppy work will be penalized.

All lab reports will be graded based on clarity, correctness and thoroughness of numerical results as well as professional presentation. These should be written in a font size 12 using Calibri or Times New Roman in word. Use single space for line spacing and 1-inch margins for top, bottom, left and right of the pages. Read the document *Formatting of Lab Reports and Grading Rubric* found in the lab Bb orientation folder for a complete list of formatting requirements, grade weighing and clear information about how the reports will be scored.

Late laboratory reports will be accepted at 10% grade deduction per day. No late reports will be accepted after 1 week. In case of an emergency, contact the laboratory instructor in advance.

12. Laboratory Safety Instructions

1. Please note the main exit in the laboratory room. Under a time-sensitive emergency the primary emergency exit consists of breaking the glass on the large window by throwing an object against it and using it as an exit.

2. Memorize the locations of the fire extinguisher and first aid kit.

3. Do not work in the laboratory alone, leave the laboratory station unattended, or disturb other laboratory groups unnecessarily.
4. Rotating equipment is sometimes used in the laboratory. To prevent accidents do not wear loose clothing or jewelry that could be caught in the equipment. Students with long hair should confine it before entering to the laboratory.

5. Do not wear high heel shoes or open-toed shoes such as sandals. Instead wear shoes with good grip that protect the feet completely. Students wearing open-toed shoes or high heels may be required to change them before being allowed into the lab.

6. Pay constant attention to electrical conditions. Water and electricity do not mix!

7. Do not run or play in the laboratory areas.

8. No food or drink is allowed in the laboratory.

9. Use of smartphones, iPads, or electronic devices that may cause distraction are strictly prohibited during the experiments.

10. Every effort should be made to create a clean and safe environment. Common sense of safety should be paramount to each student.

11. Report any accident or injury to the instructor immediately.

13. General Policies

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

13.1 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 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
13.2 Title IX Statement

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
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.

13.3 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.

13.4 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.

13.5 Student Conduct Policies

13.5.1. 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 Statement of Academic Integrity.

13.5.2. 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.

13.5.3. 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.

13.6 Required Use of Masks/Facial Coverings by Students in Class

As a member of the Texas Tech University System, Angelo State University has adopted the mandatory Facial Covering Policy to ensure a safe and healthy classroom experience. Current research on the COVID-19 virus suggests there is a significant reduction in the potential for transmission of the virus from person to person by wearing a mask/facial covering that covers the nose and mouth areas. Therefore, in compliance with the university policy students in this class are required to wear a mask/facial covering before, during, and after class. Faculty members may also ask you to display your daily screening badge as a prerequisite to enter the classroom. You are also asked to maintain safe distancing practices to the best of your ability. For the safety of everyone, any student not appropriately wearing a mask/facial covering will be asked to leave the classroom immediately. The student will be responsible to make up any missed class content or work. Continued non-compliance with the Texas Tech University System Policy may result in disciplinary action through the Office of Student Conduct.

14. Instructor Prerogative

The instructor reserves the right to change the policies and procedures of this course when he deems it necessary. Any such changes will be implemented fairly and will typically not be a detriment to your grade. The instructor will notify you of any such changes in a timely manner.
15.  **Course Outline**

The course outline is presented in next page. Detailed homework assignments along with updates to this schedule will be provided via Blackboard.

Table 3. Laboratory Course Outline.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lab Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>W, 08/19</td>
<td>Intro, Safety, Statistics and First Assignment</td>
</tr>
<tr>
<td>2</td>
<td>W, 08/26</td>
<td>Lab 01: Density, SG, viscosity</td>
</tr>
<tr>
<td>3</td>
<td>W, 09/02</td>
<td>Lab 02: Basic Manometry</td>
</tr>
<tr>
<td>4</td>
<td>W, 09/09</td>
<td>Lab 03: Hydrostatic forces - The center of pressure</td>
</tr>
<tr>
<td>5</td>
<td>W, 09/16</td>
<td>Lab 04: Pascal Apparatus and Archimedes Principle</td>
</tr>
<tr>
<td>6</td>
<td>W, 09/23</td>
<td>Lab 05: Flow measurement with the Pitot tube</td>
</tr>
<tr>
<td>7</td>
<td>W, 09/30</td>
<td>Lab 06: Orifice flow - The free jet</td>
</tr>
<tr>
<td>8</td>
<td>W, 10/07</td>
<td>Lab 07: Impact of a fluid Jet</td>
</tr>
<tr>
<td>9</td>
<td>W, 10/14</td>
<td>Flow in Pipes Theory</td>
</tr>
<tr>
<td>10</td>
<td>W, 10/21</td>
<td>Lab 08: Major headlosses</td>
</tr>
<tr>
<td>11</td>
<td>W, 10/28</td>
<td>Lab 09: Minor headlosses</td>
</tr>
<tr>
<td>12</td>
<td>W, 11/04</td>
<td>Fountain Project Work</td>
</tr>
<tr>
<td>13</td>
<td>W, 11/11</td>
<td>Final project presentations</td>
</tr>
<tr>
<td>14</td>
<td>W, 11/18</td>
<td>Back-up</td>
</tr>
</tbody>
</table>

*Schedule subject to change. Any changes will be announced on Blackboard and via email.

14.  **End Notes: Complete Hyperlinks From Syllabus**

i  [https://www.angelo.edu/content/profiles/6462-aldo-r-pinon-villarreal](https://www.angelo.edu/content/profiles/6462-aldo-r-pinon-villarreal)
iii [http://www.angelo.edu/catalogs/](http://www.angelo.edu/catalogs/)
iv [http://www.angelo.edu/services/disability-services/](http://www.angelo.edu/services/disability-services/)
v [http://www.angelo.edu/incident-form](http://www.angelo.edu/incident-form)
vi [http://www.angelo.edu/title-ix](http://www.angelo.edu/title-ix)
vii [http://www.angelo.edu/title-ix](http://www.angelo.edu/title-ix)
viii [http://www.angelo.edu/content/files/14197-op-1011-grading-procedures](http://www.angelo.edu/content/files/14197-op-1011-grading-procedures)
x [http://www.angelo.edu/dept/writing_center/academic_honesty.php](http://www.angelo.edu/dept/writing_center/academic_honesty.php)