

## ENGR 3404L: Introduction to Fluid Mechanics Laboratory Spring 2022

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### 1. Course Logistics

- Semester: Spring 2022 Section 01Z
- Class Days: Mondays
- Class Time: 3:00pm – 5:50pm
- Location: Hunter Strain 103

### 2. Instructor Information

- Aldo Pinon-Villarreal, PhD
- Email: [apinonvillarreal@angelo.edu](mailto:apinonvillarreal@angelo.edu)
- Phone: (325) 486-5510
- Office: VIN 272
- Office Hours: [Posted on Dr. Pinon's ASU Faculty Website<sup>i</sup>](#)

### 3. Required Materials

- Series of Lab handouts 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

Course Learning Outcome	1 Solve Problems	2 Design	3 Communication	4 Ethics & Professionalism	5 Teamwork	6 Experimentation	7 Acquire Knowledge
1			X		X	X	
2	X	X		X	X	X	
3			X	X	X		

## 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. Follow all COVID-19 guidelines and lab safety instructions given before and during the laboratory sessions. You are expected to adhere to COVID-19 and safety guidelines (Read Lab Safety Instructions Section).
2. Read the required material and watch the online videos of the experimental procedures in advance of the experiment. Laboratory material will be posted on blackboard in advance for you to review.
3. A short online quiz will be given before each lab session. The quiz includes questions the experiment to be conducted on that day and about the previous laboratory assignment. Links to the Quizzes will be posted on Blackboard.
4. 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.
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 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:

Laboratory short quizzes	10%
Self + Peer Lab Activity Evaluation	10%
<u>Laboratory reports</u>	<u>80%</u>
TOTAL	100%

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:

Introduction and Objectives	20%
Experimental Procedures	20%
Results	20%
Discussion	10%
Conclusion	10%
Sample Calculations	10%
<u>Professionalism</u>	<u>10%</u>
TOTAL	100%

## 11. Laboratory Reports

All laboratory sessions require an engineering report written with professionalism unless specified otherwise by the instructor. All lab assignments are due at the beginning of the following lab session via Gradescope. 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 11 or 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.
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 unless being used to collect data.
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. Classroom and University Policies and Student Support**

#### **13.1 General Policies**

All students are required to follow the policies and procedures presented in the [Angelo State University Student Handbook](#)<sup>ii</sup> and [Angelo State University Catalog](#)<sup>iii</sup>.

#### **13.2 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](mailto:ADA@angelo.edu). For more information about the application process and requirements, visit the [Student Disability Services website](#).<sup>iv</sup> 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](mailto:dallas.swafford@angelo.edu)  
Houston Harte University Center, Room 112

### 13.3 Title IX Statement

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](#)<sup>v</sup>

Face to Face: Mayer Administration Building, Room 210

Phone: 325-942-2022

Email: [michelle.miller@angelo.edu](mailto: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](#).<sup>vi</sup>

### 13.4 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](#)<sup>vii</sup> for more information.

### 13.5 Information About COVID-19

Please refer to ASU's [COVID-19 \(Coronavirus\) Updates](#)<sup>viii</sup> web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

### 13.6 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.

#### 13.5.2. Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#)<sup>ix</sup> 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](#)<sup>x</sup>.

### 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.

## 14. 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 for sections 01Z (Wednesday) and 02Z (Friday).

Week	Dates	Lab Topic
1	1/24	Introduction, lab safety; use of statistics and spreadsheets; First
2	1/31	Lab 01: Fluid properties Density, specific gravity, and viscosity
3	02/07	Lab 02: Measurement of Viscosity
4	02/14	Lab 03: Basic Manometry
5	02/21	Lab 04: Hydrostatic forces - The center of pressure
6	02/28	Lab 05: Pascal Apparatus and Archimedes Principle
7	03/07	Fountain Pump Head Curve Measurement
8	03/14	Spring Break
9	03/21	Lab 06: Flow measurement with the Pitot tube
10	03/28	Lab 07: Orifice flow - The free jet
11	04/04	Lab 08: Impact of a fluid Jet
12	04/11	Flow in Pipes Theory and Fountain Calculations
13	04/18	Lab 09: Major and minor headlosses
14	04/25	Fountain Project Work
15	05/02	Display Fountain and Submit Project video

## 15. End Notes: Complete Hyperlinks From Syllabus

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<sup>i</sup> <https://www.angelo.edu/content/profiles/6462-aldo-r-pinon-villarreal>

<sup>ii</sup> <http://www.angelo.edu/student-handbook/>

<sup>iii</sup> <http://www.angelo.edu/catalogs/>

<sup>iv</sup> <https://www.angelo.edu/current-students/disability-services/>

<sup>v</sup> <https://www.angelo.edu/incident-form>

<sup>vi</sup> <https://www.angelo.edu/title-ix>

<sup>vii</sup> <http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>

<sup>viii</sup> <https://www.angelo.edu/covid-19/>

<sup>ix</sup> <http://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

<sup>x</sup> [http://www.angelo.edu/dept/writing\\_center/academic\\_honesty.php](http://www.angelo.edu/dept/writing_center/academic_honesty.php)