

MENG 3310 – Fluid Mechanics
Department of Mechanical Engineering
College of Engineering and Computer Science
The University of Texas at Tyler
Spring 2020 Semester

Instructor

Dr. Nelson Fumo
Office: Ratliff Building North (RBN) 3009
E-mail: nfumo@uttyler.edu

Office Hours: Tu/Th/Fr 11:00 am – 12:00 pm, or by appointment.

Course Details

Description: Basic concepts of a fluid, and the fundamentals and applications of ideal and real fluid flow. Topics include fluid statics, conservation principles, the Bernoulli equation, fluid flow in pipes, and fluid flow measurement devices.

Credit hours: 3 credit hours with 3 hours of lecture per week

Prerequisites: C or better grade in ENGR 2302 and MATH 3305; and (MATH 3404 as a co-requisite)

Class Meeting: Monday and Wednesday 11:00 – 12:20 pm, RBN 2007

Textbook: Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, 8th Edition, Wiley, 2016. Binder Ready Version (looseleaf); ISBN: 9781119080701.

Other presentations:

- Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, 8e Binder Ready Version with WileyPLUS Card Set; ISBN: 9781119231714.
- Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, 8e WileyPLUS Card (this includes an e-book but with no printed book); ISBN: 9781118847244.

Additional Material:

- Schaum's Outline of Fluid Mechanics, M. Potter and D. Wiggert, McGraw-Hill, 2008.
- Student Solutions Manual and Study Guide, Fundamentals of Fluid Mechanics, 7th, Munson et al, Wiley, 2013.

Expected Learning Outcomes

By the end of this course students will be able to:

1. Apply concepts of fluid statics.
2. Apply principles of conservation of mass, momentum, and energy in engineering problems.

3. Use Bernoulli's Equation for the calculation of flow parameters.
4. Calculate and use minor and major head losses in pipe flows.
5. Apply basic boundary layer theory to external flows.

Evaluation activities

- Exams: there will four exams and the final exam. The final exam is comprehensive but with focus on Chapter 9. Section 8.6 (reading) will be also evaluated.
- Proposed problems: proposed problems will be given but not graded. Students are encouraged to solve the proposed problems to keep up with the material covered in class and as a guide to master the material that will be evaluated in the exams. Solution of these problems may be requested by the instructor to discuss related problems in the exams.

Grading

Exam 1	25%	<u>Scale:</u> A	90 – 100
Exam 2	20%	B	80 – 89
Exam 3	15%	C	70 – 79
Exam 4	20%	D	60 – 69
Final exam	20%	F	< 60

Grade appeal: grades can be appealed by meeting the instructor during office hours, but no later than a week after the grade has been given.

Attendance Policy and Makeup Policy

Attendance at every lecture is strongly encouraged but not mandatory. There will be no makeup for missed in-class work. An opportunity to make up a missed exam may be available to students with an excused absence. Excused absences include absences for University-sponsored events and for religious observances (see the University policy link above for the procedures to follow). Other makeups are granted only in extreme cases and at the discretion of the instructor. Excused absence due to illness will require evidence of treatment by medical personnel at a medical facility.

Changes to Syllabus and Course Schedule

I reserve the right to make changes to the syllabus or course schedule during the semester. Any changes to course policies will be announced in class, and an updated version of the syllabus or course schedule will be posted in CANVAS.

Student Behavior

- Academic dishonesty, in the form of cheating, fabrication, falsification, multiple submissions, plagiarism, and complicity, will not be tolerated. Regulations about academic dishonesty are contained in *A Student Guide to Conduct and Discipline at UT Tyler*, which may be obtained from the Office of Student Affairs.
- The use of cellular phones during the class is prohibited. Laptops and tables can be used only when justified and with the consent of the instructor.

Census date: January 27, 2020 (Date to withdraw without penalty)

University Policies:**UT Tyler Honor Code**

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>

UT Tyler a Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors.

Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products.

There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support.

For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms , requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes , adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another

2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability/Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

Student Standards of Academic Conduct

Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

i. "Cheating" includes, but is not limited to:

- copying from another student's test paper;
- using, during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;
- possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". The presence of textbooks

constitutes a violation if they have been specifically prohibited by the person administering the test;

- using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
 - collaborating with or seeking aid from another student during a test or other assignment without authority;
 - discussing the contents of an examination with another student who will take the examination;
 - divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
 - substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
 - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
 - falsifying research data, laboratory reports, and/or other academic work offered for credit;
 - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
 - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.
- ii. “Plagiarism” includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another’s work and the submission of it as one’s own academic work offered for credit.
- iii. “Collusion” includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.
- iv. All written work that is submitted will be subject to review by plagiarism software.

UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)

Course schedule

Lec	Day	Date	Topic	Reading
1	Mo	13-Jan	Course Introduction	
2	We	15-Jan	Introduction	1.1 - 1.9
	Mo	20-Jan	Martin Luther King - No class	
3	We	22-Jan	Pressure and Manometry	2.1 - 2.7
4	Mo	27-Jan	Forces on Surfaces	2.8 - 2.10
5	We	29-Jan	Buoyancy, Flotation, Stability	2.11
6	Mo	3-Feb	Work on related problems	
7	We	5-Feb	Exam 1 - Chapter 1 and 2	
8	Mo	10-Feb	Elementary Fluid Dynamics - Bernoulli Equation	3.1 - 3.5
9	We	12-Feb		3.6 - 3.7
10	Mo	17-Feb	Velocity/Acceleration Fields & Reynolds Transport Theorem	4.1 - 4.4
11	We	19-Feb	Conservation of mass (Int)	5.1
12	Mo	24-Feb	Linear Momentum (Int)	5.2.1 - 5.2.2
13	We	26-Feb	Exam 2 - Chapter 3 and 4 and Section 5.1	5.2 No in Exam
14	Mo	2-Mar	The Energy Equation	5.3.1 - 5.3.4
15	We	4-Mar	Viscous Flow	6.8 - 6.9
	Mo	9-Mar	Spring Break	8.6
	We	11-Mar		
16	Mo	16-Mar	Work on related problems	
17	We	18-Mar	Exam 3 - Chapter 5 and 6	
18	Mo	23-Mar	Dimensional analysis, similitude, and modeling	7.1 - 7.3
19	We	25-Mar		7.4 - 7.8
20	Mo	30-Mar	Viscous Flow in Pipes	8.1 - 8.2
21	We	1-Apr	Losses in Pipes	8.4
22	Mo	6-Apr	Losses in Pipes	8.5
23	We	8-Apr	Work on related problems	
24	Mo	13-Apr	Exam 4 - Chapter 7 and 8	
25	We	15-Apr	External Flow and Boundary Layers	9.1 - 9.2
26	Mo	20-Apr	Drag	9.2 - 9.3
27	We	22-Apr	Work on related problems	
		27-Apr	Study Day	
			Final Exam - Comprehensive	