BMEN 3311 – Biomedical Signal Processing
Fall 2023 Syllabus

Instructor:

Dr. Lin Li

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Office: NTDP 240F

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Office Hours: Tuesday, Thursday at 11 AM. – 12:30 PM, by appointment through e-mail.

TA:

Nastaran Jafari

NastaranJafari@my.unt.edu

Office Hours: TBD; by appointment through e-mail

Class Schedule:

Monday, Wednesday 1:00 PM – 1:50 PM, NTDP K110

Every week except holiday or prior notice.

Based on the 2023 UNT final exam schedule, our final exam is at Saturday, December 9 10:30AM - 12:30 PM.

Lab Schedule:

BMEN 3311-301 Thursday 9:30 AM – 12:20 PM, NTDP F242

BMEN 3311-302 Friday 11:30 AM - 2:20 PM, NTDP F242

12 labs (6 reports) total.

Required Textbooks:

Digital Signal Processing, 3rd edition

Li Tan, Jean Jiang

ISBN: 978-0128150719

Suggested Reading:

Matlab: A Practical Introduction to Programming and Problem Solving, 2nd edition

Stormy Attaway

ISBN: 978-0-12-385081-2

Welcome to UNT!

As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of the students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. UNT's full Non-Discrimination Policy can be found in the UNT Policies section of the syllabus.

Catalog Course Description:

The BMEN 3311-Biomedical Signal Processing course is designed for the senior undergraduates to prepare the in-depth knowledge of mathematics and the computational technologies on the biomedical signal analysis. This course covers the time and frequency domain fundamentals of biomedical signals. It will also include the biomedical signal transformation methods, digital filter designs, and provide the guide of the state-of-the-art time-frequency analysis methods. Students will also get training on the MATLAB programming and experience the applications on the biomedical signal analysis.

Prerequisite(s): BMEN 2320 or equivalent.

ABET Criteria:

BMEN 3311 addresses the following ABET program outcomes:

Student Outcome 6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Lectures & Course Objectives:

Based on the 25 lectures, students will:

1. Learn the Matlab coding environment
2. Learn the fundamentals of biomedical signals
3. Understand process for converting analog signals to digital format
4. Learn signal transform and understand frequency domain
5. Understand responses of linear systems with digital filters
6. Apply digital signal processing techniques to biomedical applications such as ECG, EEG, EMG

Homework:

A total of 4 homework assignments will be given using UNT's Canvas online portal. Homework due dates are given with assignment. Homework is turned in class the day it is due. The detailed **Homework Policies** can be checked as follows:

- Homework due date and time will be clearly announced on canvas. 20 points will be deducted for the late homework submission. Zero scores will be given if the homework is not submitted when the answer is posted.
- Homework must be scanned neatly on a **word** or p**df**

Two ways to complete your homework:

(1) work on Pad or computer with MS word or other software and submit a word/PDF file;

(2) writing on papers, taking photos, and use software to combine them into a PDF and submit (adobe scanner is free and available on both iPhone and Android).

- Submission is through Canvas portal.

- If homework requires changes (typo, missing information), details will be posted on canvas.
- Pro Tip: Do not try and submit the last minute in case you have issues turning in. **Last-minute turn in issues is no excuse for late assignments.**
- Zero scores will be given if plagiarism is found.

Labs:

A total of 7 labs will be given in the class. Before each lab, a document with questions will be uploaded on Canvas. The MATLAB-based questions are related to the course content. The labs are scored based on the lab report. Labs are in a hybrid format. Students can come to school during the lab time to finish the lab and/or can choose to work at home with the MATLAB program. The TA will show-up during the lab section. Q & A is only provided for the on-campus format.

Make sure to download the MATLAB program and follow the installation instruction at MathLabLinks to an external site. (https://math.unt.edu/mathlabLinks to an external site.)

Lab policies can be found as follows:

- Lab report due date and time will be clearly announced on canvas. 20 points will be deducted for the late lab report submission. Zero scores will be given if the lab report is not submitted when the answer is posted.
- Lab report must be scanned neatly on a **word** or **pdf**

Two ways to complete your lab report:

(1) work on iPad or computer with MS word or other software and submit a word/PDF file;

(2) writing on papers, taking photos, and use software to combine them into a PDF and submit (adobe scanner is free and available on both iPhone and Android).

- Submission is through the Canvas portal.
- If the lab report requires changes (typo, missing information), details will be posted on canvas.
- Pro Tip: Do not try and submit the last minute in case you have issues turning in. Last-minute turn in issues is no excuse for late assignments.
- Zero scores will be given if plagiarism is found.

Exam

Two exams will be assigned on this course. Both exams are closed-book, closed-note, written exam. Exam will take in an assigned period. There is NO make-up exams. Exam policy will be given on the later of class for the detailed instructions of exam format, allowing items, and schedule.

Grade Evaluation:

Homework	20 %
Exam 1	25 %
Exam 2	25 %
Lab	30 %

A – 90-100%

B – 80-89%

C – 70-79%

D – 60-69%

F – < 60%

Course Technology & Skills

Minimum Technology Requirements

- Computer
- Reliable internet access
- Speakers/headphone/earphone
- Webcam
- MATLAB 2019b version software installed
- Microsoft Office Suite installed
- PDF reader

- Canvas Technical RequirementsLinks to an external site. (https://clear.unt.edu/supported-technologies/canvas/requirementsLinks to an external site.)

Technical Assistance

Part of working in the online environment involves dealing with the inconveniences and frustration that can arise when technology breaks down or does not perform as expected. Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technical issues.

UIT Help Desk: UIT Student Help Desk siteLinks to an external site. (http://www.unt.edu/helpdesk/index.htm)

E-mail: helpdesk@unt.edu

Phone: 940-565-2324

In Person: Sage Hall, Room 130

Walk-In Availability: 8 AM-9 PM

Telephone Availability:

- Sunday: noon-midnight
- Monday-Thursday: 8 AM -midnight
- Friday: 8am-8pm
- Saturday: 9am-5pm

Laptop Checkout: 8am-7pm

For additional support, visit Canvas Technical HelpLinks to an external site. (https://community.canvaslms.com/docs/DOC-10554-4212710328Links to an external site.)

Course Policies

Attendance

Students are expected to attend class meetings regularly and to abide by the attendance policy established for the course. It is important that you communicate with the professor and the instructional team prior to being absent, so you, the professor, and the instructional team can discuss and mitigate the impact of the absence on your attainment of course learning goals. Please inform the professor and instructional team if you are unable to attend class meetings because you are ill, in mindfulness of the health and safety of everyone in our community.

If you are experiencing any symptoms of COVID-19Links to an external site. (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.htmlLinks to an external site.) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Team at COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure.

Instructor Responsibilities and Feedback

- regarding your responsibilities in the course (i.e.: helping students grow and learn; providing clear instructions for projects and assessments, answering questions about assignments, identifying additional resources as necessary, providing grading rubrics, reviewing and updating course content, etc.);
- an estimated timeline and format in which students can anticipate a response regarding e-mails, discussion board posts if applicable, assignment feedback, and grades.
- It is my intention to ensure that students from diverse backgrounds and perspectives will be well served by this course. Diversity of students in this class will be an asset to learning and understanding the material. This course welcomes students of all ages, backgrounds, beliefs, ethnicities, gender identities, national origins, religious affiliations and sexual orientations. All students in this class are expected to contribute to a respectful, welcoming and inclusive environment for all other members of this class. If you feel that your contribution is not being valued, please feel free to speak with me during office hours.

Syllabus Change Policy

The syllabus may change during the class period. A prior notification will be given to the class.