BMEN 3325.001: Advanced Computational Tools for Biomedical Engineering

Spring 2021 **Instructional Mode 4 (Remote/Virtual via MS Teams)**
Asynchronous Video Lectures, TBD
Online interactive office hours, TR 10 – 11:15 AM (UTC-6; UTC-5 after 3/14/21) and by appointment

Professor Contact Information

Professor	Stephen Levene, PhD
Office Phone	972-883-2503
Email Address	sdlevene@utdallas.edu
Office Location	BSB 12.909
Other Information	Office hours held via MS Teams. Identity verification may be required for compliance with FERPA regulations.

Course Format Summary

Instructional Mode	Mode 4 (Remote/Virtual via MS Teams)
Course Platform	Course content accessible through eLearning (elearning.utdallas.edu). Additional optional interaction through MS Teams.
Asynchronous Learning Guidelines	Asynchronous access to material is possible without notifying instructor. Synchronous office hours are intended for live Q&A, not lecturing. However, there are **posted** deadlines for homeworks and quizzes. Exam dates are fixed 24-hour periods with 2-hour long exams to be completed within one sitting.

Catalog Description

MATLAB is an increasingly important tool for solving data-driven Bioengineering/Biomedical Engineering (BE/BME) problems. MATLAB is both a programming language and a platform with toolboxes for data acquisition, processing, visualization, analysis, as well as simulation. This course will provide extensive training on how to use these advanced engineering tools in MATLAB. These tools could work either with hardware or as independent software. Advanced topics in programming and programming skills for solving biomedical problems. Advanced topics in programming and computational models will be introduced in lectures. Class assignments, home assignments, and class projects will be used for practice and training. The course will help students to be better prepared for their junior, senior, graduate study, or professional work. Prerequisite: BMEN 1208. (1.5-1.5) Y

Student Learning Objectives/Outcomes

1) Formulate and solve mathematical problems using appropriate Matlab algorithms. (ABET 1)

2) Write and execute Matlab programs to solve engineering problems. (ABET 1)

3) Understand the strengths/weaknesses of programming languages, recognize the need to research appropriate software tools to solve problems, and learn new programming languages when necessary. (ABET 7)

Course Pre-requisites, Co-requisites, and/or Other Restrictions

BMEN 1208 – Introduction to Bioengineering II

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Technical Requirements

In addition to a standard level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience.

Course Access and Navigation
Course materials can be accessed using your UT Dallas NetID account on the eLearning (https: elearning.utdallas.edu) website. If you are not familiar with eLearning, please review the Getting Started with eLearning webpage (https://ets.utdallas.edu/elearning/students/current/getting-started). Tutorials to help you become familiar with the eLearning tool, can be found on the Student eLearning Tutorials webpage.

UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The eLearning Support Center includes a toll-free telephone number for immediate assistance (1-866-588-3192), support for email requests, and an online chat service.

Required Textbooks and Materials

Required Texts
MATLAB Programming for Biomedical Engineers and Scientists by King and Aljabar
ISBN 978-0-12-812203-7

Required Materials
Computer with internet connection and **MATLAB R2020b** installed is required. MATLAB is available at no cost to UTD students. See https://www.utdallas.edu/oit/howto/matlab/ for installation instructions.

MS Office access, including Microsoft Teams and Stream, is required for accessing course content. This software is accessible at no cost to UTD students. See https://www.utdallas.edu/oit/o365/ for installation instructions.

Students will also need **webcams with microphones** for interactions with instructor and classmates via Teams. The instructor may require that cameras be turned on during class meetings and office hours.

Textbooks and some other bookstore materials can be ordered online or purchased at the UT Dallas Bookstore.

Additional Materials
The Instructor may provide additional class materials that will be made available to all students registered for this class in order to supplement the classroom experience. These materials may be downloaded from eLearning during the course; however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not enrolled in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct. (https://policy.utdallas.edu/utdsp5003)

Course Policies

Student expectations
You are expected to engage with the material and instructor regardless of instruction modality; this includes viewing/reading assignments prior to scheduled class meetings (either online or in-person). As a 3-credit-hour course, two to three hours of work outside the classroom for every hour of in-class discussion time is expected. Therefore, you should be prepared to spend between 6 and 9 hours of work on the course material per week in order to complete this course successfully.

Participation in online discussions during class-meeting periods are strongly encouraged and may be used to assign extra credit. You are expected to behave courteously toward fellow students and the instructor at all times. Compliance with the Student Code of Conduct is required (see below).

Instructor expectations
I will conduct all online lectures/discussions and post all instructional materials as specified in this document. Additional material/assignments may be posted as appropriate. I will treat you as an adult with courtesy and respect. I normally respond to emails within 24 business hours on weekdays and 48 business hours on weekends. Assignments and exams will be graded and results made available within 7 calendar days.

Make-up exams
There is a 100% penalty for late exam submission unless extreme extenuating circumstances can be documented such as a widespread network outage. Because of the general 24-hour window for assignment/exam submission, no makeup quizzes or exams will be given.

Class recordings
The instructor may record meetings of this course. Any recordings will be available to all students registered for this class as they are intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has granted approval to a student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online sources except to implement an approved Office of Student AccessAbility accommodation. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law. Failure to comply with these University requirements is a violation of the Student Code of Conduct. (https://policy.utdallas.edu/utdsp5003).

COVID-19 Guidelines and Resources

The information contained in the following link lists the University's COVID-19 resources for students and instructors of record. The link also includes standard university policies or additional links thereto.

Please see UT Dallas Syllabus Policies and Procedures (https://go.utdallas.edu/syllabus-policies)

Distance Learning Student Resources

Online students have access to resources including the McDermott Library, Academic Advising, The Office of Student AccessAbility, and many others. Please see the eLearning Current Students webpage for more information.

Server Interruptions or Other Technical Difficulties

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time-sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor ***and also*** contact the online eLearning Help Desk. (ets.utdallas.edu/elearning/helpdesk or 866-588-3192). The instructor and the eLearning Help Desk will work with the student to resolve any issues as soon as possible.

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Class Schedule, Spring 2021

WEEK	STARTING	TOPIC/LECTURE	READING	ASSESSMENT / ACTIVITY	DUE DATE*
1	1/19	Introduction to course and MATLAB	Chapter 1	HW 1	2/02 5 pm
2	1/25	Control Structures	Chapter 2	HW 2	2/03 5 pm
3	2/01	Functions	Chapter 3	HW 3, Quiz 1	2/09 5 pm
"	**2/03**	**Last day to drop without at "W"**			
4	2/08	Program development and Testing	Chapter 4	HW 4,	2/16 5 pm
5	2/15	Data Types	Chapter 5	HW 5, Quiz 2	2/23 5 pm
6	**2/22**	**Review 1 and Exam 1**	**-**	**Exam 1**	**2/25 2 pm to 2/26 2 pm**
7	3/01	File Input/Output	Chapter 6	HW 6, Quiz 3	3/09 5 pm
8	3/08	Program Design	Chapter 7	HW 7	3/23 5 pm
9	**3/13 – 3/21**	**Spring Break**			
10	3/22	Visualization	Chapter 8	HW 8, Quiz 4	3/30 5 pm
11	3/29	Code Efficiency	Chapter 9	HW 9	4/06 5 pm
12	4/5	Signal and Image Processing	Chapter 10	HW 10, Quiz 5	4/13 5 pm
"	**"**	**Withdrawal period ends**			
13	**4/12**	**Review 2 and Exam 2**	**-**	**Exam 2**	**4/15 2 pm to 4/16 2 pm**
14	4/19	Biomedical applications (1), project start	Handout**	HW 11	4/27 5 pm
15	4/26	Graphical User Interfaces	Chapter 11	HW 12, Quiz 6	5/4 5 pm
16	5/3	Biomedical Applications (2)	Handout**	Project Complete	project due by 5/5 5 pm
Final	**5/10-5/17**	**Final Exam**	**-**	**-**	**TBA - 24 hour window**

Grading Policy

Homework, 20%; Quizzes, 10%; Project, 20%; Exam 1, 15%; Exam 2, 15%; Final Exam, 20%
Letter grades will be assigned in accordance with the numerical scale below:

Score	97.0+	96.99-93.0	92.99-90.0	89.99-87.0	86.99-83.0	82.99-80.0	79.99-77.0	76.99-73.0	72.99-70.0	69.99-60.0	<60
Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
		Excellent			Good			Fair		Poor	Failure

Grading Policy (cont'd)

Make-up exams
There is a 100% penalty for late exam submission unless extreme extenuating circumstances can be documented such as a medical emergency or widespread network outage. If an exam date has to be rescheduled for medical reasons or because of another extreme circumstance, please contact the instructor via email at least one week in advance and be prepared to submit appropriate documentation.

Extra Credit
There are extra questions within some assignments for minor additional credit. Lowest quiz and two lowest homework grades will be dropped.

Late Work
No late work is accepted without exigent circumstances. Email the instructor and TA as soon as possible if you have an issue.

Special Assignments
There may be some short small-group assignments. Groups will be assigned for each of these assignments through eLearning and group tasks can be completed asynchronously.

Incomplete Grade Policy
Per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Student Code of Conduct

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records (consult the Student Code of Conduct for further information). Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course may use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administrative procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School

Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students. Please go to Academic Support Resources webpage for these policies.

UT Dallas Syllabus Policies and Procedures

Information regarding the University's policies and procedures segment of the course syllabus can be found in the UT Dallas Syllabus Policies webpage.

All assignments, conditions, and timelines set forth in this syllabus are subject to change at the discretion of the Instructor.