



Course	Numerical Linear Algebra and Statistical Computing
Class number	Stat 6341.001
Professor	Sy Han (Steven) Chiou
Term	Fall 2020
Schedule	Tuesday, Thursday, 10:00 am–11:15 am

Professor's Contact Information

Office Phone	972.883.6362
Office Location	FO 2.410A
Email address	schiou@utdallas.edu (I don't read eLearning mails)
Office Hours	Tuesday, Thursday, 2:00 pm - 3:00 pm or by appointment. Virtual office hours will be held using Microsoft Teams; email for instructions.

Course Modality and Expectations

Instructional mode	Remote/virtual
Course platform	Microsoft Teams; a link will be announced 10 minutes before lecture starts.
Course website	All course related materials, including lecture notes, will be posted on eLearning.
Expectations	Students should attend the lectures, take notes, and complete all assignments at the designated time. Students are not allowed to collaborate with classmates or people outside of this class (including on-line forum) on assignments.
Asynchronous learning guidelines	STAT 6341 has been designed to accommodate both asynchronous and synchronous students. Students who plan to participate via asynchronous access will need to notify me as soon as the choice is made. See the <i>Student Guidelines for the Asynchronous Option</i> at https://www.utdallas.edu/fall-2020/asynchronous-access-for-fall-2020/ .

COVID-19 Guidelines and Resources

Class participation	Class participation is mandatory and will be measured using the in-lecture activities. <i>Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus.</i>
Class recordings	All lectures will be recorded and be made available on eLearning. <i>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 approved the 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 environments except to implement an approved Office of Student AccessAbility accommodation.</i>
Class materials	All class materials will be made available to all students registered for the class. <i>These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation.</i>
Failure to comply with these University requirements is a violation of the Student Code of Conduct.	
Useful links	Fall 2020 instruction modalities: https://coursebook.utdallas.edu/modalities UTD's COVID-19 resources: http://go.utdallas.edu/syllabus-policies Fall 2020 FAQ: https://utdallas.edu/fall-2020/faq/ Technical support: https://ets.utdallas.edu/elearning/helpdesk

General Course Information

Prerequisite	Prerequisite: STAT 5352 or STAT 6337. Basic knowledge in R.
Course Description	A study of computational methods used in statistics. Topics to be covered include the simulation of stochastic processes, numerical linear algebra, QR decomposition and least squares regression, singular value decomposition and multivariate data, statistical programming languages, and graphical methods.
Learning outcomes	<ol style="list-style-type: none">1. A working understanding of numerical, statistical, and computational issues associated with major matrix decompositions including the lower-upper (LU) decomposition, QR decomposition, and the singular value decomposition (SVD).2. Understand how to express basic mathematical and statistical problems in R.3. Have a working knowledge in Rcpp.4. Become familiar with developing and performing simulation studies in R.
Required Text	<i>Modern Applied Statistics with S</i> , 4th edition by W.N. Venables and B.D. Ripley. ISBN: 978-0387954578
Supplementary Text	<ol style="list-style-type: none">1. <i>Numerical Linear Algebra for Applications in Statistics</i> by James E. Gentle. ISBN: 0-387-98542-52. <i>Basic Elements of Computational Statistics</i> by Wolfgang Karl Härdle, Ostap Okhrin, and Yarema Okhrin. ISBN: 978-3-319-55335-13. <i>Independent random sampling methods</i> By Luca Martino, David Luengo, and Joaquín Míguez. ISBN: 978-3-030-10241-8

Course Policies

Grading criteria	<p>The course letter grade will be determined based on homework, two exams, and a final presentation. The assignments should be submitted via email within the designated submission window; late assignments will not be graded and will be counted as 0. All reports should be prepared with the provided R Markdown templates. A .Rmd file and a .pdf file (generated by R Markdown) are required in submission. Submissions without these two files, or submission with a .Rmd that won't compile will not be graded. The breakdown of the assignments is as follows.</p> <p>Homework (25%): There will be 5 homework assignments, the lowest homework grade will be dropped.</p> <p>Exam 1(25%), Exam 2(25%): There will be 2 exams. Students are not allowed to collaborate with classmates or people outside of this class (including on-line forum) on assignments.</p> <p>Final presentation (25%): Students will be asked to prepare a lightning-talk (~10 minutes) presentation on relevant topics that are not covered in the lecture. A list of potential topics will be posted on eLearning.</p>
Letter grade	The letter grade will be assigned based on the overall course score with the cutoffs: A: [93, 100]; A⁻ [90, 93); B⁺ [87, 90); B [83, 87); B⁻ [80, 83); C⁺ [77, 80); C [60, 77); F [0, 60).
Policy on the use of electronic devices	For many students, using laptops or other personal computing devices in lecture is an efficient way to read lecture slides and take notes. However, using these in ways that are not related to course work can be distracting to other nearby students. Please limit the use of personal computing devices in lecture to activities directly related to the lecture.
Student conduct and discipline	The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of university business. See the UTD publication, A to Z Guide, issued to each registered student.
Academic integrity	The faculty expects from students a high level of responsibility and academic honesty. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, and falsifying of records. Violators face disciplinary proceedings.

Tentative Course Schedule

	Topics
Week 1 (8/18)	Introduction to R Studio, Rmarkdown, and vectors/matrices notations.
Week 2 (8/25)	Basic matrix operations, and Rcpp.
Week 3 (9/1)	Eigenanalysis & condition of matrices.
Week 4 (9/8)	Matrix factorizations.
Week 5 (9/15)	Matrix factorizations.
Week 6 (9/22)	Matrix factorizations.
Week 7 (9/29)	Iterative procedures.
Week 8 (10/6)	Iterative procedures (Exam week).
Week 9 (10/13)	Optimization.
Week 10 (10/20)	Optimization.
Week 11 (10/27)	Optimization.
Week 12 (11/3)	EM algorithm (Exam week).
Week 13 (11/10)	EM algorithm.
Week 14 (11/17)	Bootstrap.
Week 15 (12/24)	Catch up week.

More Policies

Incomplete grades	As per university policy, incomplete grades are granted only in the case of work unavoidably missed (and excused) and not already covered by the professor's policy on missed work or activities, and only if at least 70% of the course work has been completed. An incomplete grade must be resolved within eight 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 becomes changed automatically to F.
Withdrawal	Deadlines for withdrawal from courses are published in each semester's course catalog. A faculty member cannot drop or withdraw a student. It is the student's responsibility to handle withdrawal procedures from any class to avoid receiving a grade of "F".
Disability services	Disability Services seeks to provide students with disabilities educational opportunities equivalent to those of their non-disabled peers. The Office of Disability Services is located in room 1.610 in the Student Union, and its hours are Monday-Thursday 8:30 a.m. to 6:30 p.m. and Friday 8:30 a.m. to 5:00 p.m. Essentially, the law requires colleges and universities to make reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally, an assignment requirement may be modified (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes including students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance. The student should notify the professor of the need for such accommodations. Disability Services provides students with letters to present to faculty members.
Syllabus policies	The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to http://go.utdallas.edu/syllabus-policies for these policies.