UTD	**Course** Numerical Linear Algebra and Statistical Computing
	Class number Stat 6341.001
	Professor Sy Han (Steven) Chiou
	Term Fall 2019
	Schedule Tuesday, Thursday, 10:00 am–11:15 am, CB 1.102

Professor's Contact Information

Office Phone	972.883.6362
Office Location	FO 2.410A
Email address	schiou@utdallas.edu
Course website	All course related materials will be posted at `http://elearning.utdallas.edu/`.
Office Hours	Tuesday, Thursday, 12:30 pm - 1:30 pm or by appointment.

General Course Information

Prerequisite	Prerequisite: STAT 5352 or STAT 6337.
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	**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.** Become familiar with developing and performing simulation studies in R. **3.** Understand how to express basic mathematical and statistical problems in R.
Required Text	*Modern Applied Statistics with S*, 4th edition by W.N. Venables and B.D. Ripley. ISBN: 978-0387954578
Supplementary Text	**1.** *Numerical Linear Algebra for Applications in Statistics* by James E. Gentle. ISBN: 0-387-98542-5 **2.** *Basic Elements of Computational Statistics* by Wolfgang Karl Härdle, Ostap Okhrin, and Yarema Okhrin. ISBN: 978-3-319-55335-1 **3.** *Independent random sampling methods* By Luca Martino, David Luengo, and Joaquín Míguez. ISBN: 978-3-030-10241-8

Course Policies

Grading criteria	**Homework (30%):** There will be 6 homework assignments throughout the semester, the lowest homework grade will be dropped. The assignments should be turned in in person, either in class or during my office hours. The first homework is due on **Thursday, September 5**. **Midterm (30%), Final exam (40%):** These exams will contain a take-home portion that requires R and in-class a portion that are closed-book and closed-notes. No make-up exams are allowed unless a special arrangement made **in advance**. Missed exam due to oversleeping, car troubles, forgetfulness, etc., are not excused. The final exam date and time will be announced when it is available.
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 (8/20)	Introduction to `R/R Studio/Rmarkdown`, Vectors/Matrices notations.
Week 2 (8/27)	Basic matrix operations.
Week 3 (9/3)	Eigenanalysis & condition of matrices.
Week 4 (9/10)	Gaussian elimination & Matrix factorizations.
Week 5 (9/17)	Matrix factorizations.
Week 6 (9/24)	Iterative procedures.
Week 7 (10/1)	Iterative procedures.
Week 8 (10/8)	Other computations of eigenvectors/eigenvalues and the singular value decomposition.
Week 9 (10/15)	Midterm week
Week 10 (10/22)	Optimization
Week 11 (11/5)	EM algorithm
Week 12 (11/12)	Random number generation
Week 13 (11/19)	Markov Chain Monte Carlo
Week 14 (11/26)	Bootstrap
Week 15 (12/3)	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	he 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.