



Course	Numerical Linear Algebra and Statistical Computing
Class number	Stat 6341.001
Professor	Sy Han (Steven) Chiou
Schedule	Tuesday, Thursday, 10:00 am–11:15 am, Fall 2021
Location	SCI 3.220

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.

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: 978-3-319-55335-1

Course Policies

Grading criteria	<p>The course letter grade will be determined based on homework assignments, two in-class exams, and a final presentation. The breakdown of the grade distribution is as follows.</p> <p>Homework (25%):</p> <ul style="list-style-type: none">• There will be 6 homework assignments.• The lowest homework grade will be dropped. <p>Exams (25% + 25%):</p> <ul style="list-style-type: none">• There will be one two-hour in-class exam.• The format of the exam will be similar to that in the Ph.D. qualifying exam.• The exam will be open book and open note but students are not allowed to collaborate with classmates or people outside of this class (including on-line forum) on assignments.• The exam will be completed in the UTD testing center. <p>Final presentation (25%):</p> <ul style="list-style-type: none">• Students can choose to complete the project alone or with a teammate.• Students will be asked to prepare a lightning-talk (10 ~ 15 minutes) presentation on relevant topics that are not covered in the lecture.• Potential topics will be provided but students are welcome to come up with their ideas.
Submission guidelines	<p>Here are the general policy</p> <ul style="list-style-type: none">• All 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 a .Rmd that won't compile will not be graded.
Letter grade	<p>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).</p>

Tentative Course Schedule

	Topics
Week 1 (8/24)	Introduction to R Studio, Rmarkdown, and vectors/matrices notations.
Week 2 (8/31)	Basic matrix operations, and Rcpp.
Week 3 (9/7)	Basic matrix operations, and Rcpp.
Week 4 (9/14)	Matrix factorizations.
Week 5 (9/21)	Matrix factorizations.
Week 6 (9/28)	Matrix factorizations.
Week 7 (10/5)	Iterative procedures.
Week 8 (10/12)	Iterative procedures.(Exam 1)
Week 9 (10/19)	Optimization.
Week 10 (10/26)	Optimization.
Week 11 (11/2)	Optimization.
Week 12 (11/9)	EM algorithm.
Week 13 (11/16)	EM algorithm. (Exam 2)
Week 14 (11/23)	Thanksgiving break.
Week 15 (11/30)	Presentation.
Week 16 (12/7)	Presentation.

Testing center policies

Information that you need to know before taking an assignment at the testing center.

- The testing center is located in SP2 across Waterview Parkway from Residence Halls NW and N.
- You must register for a seat using RegisterBlast (<https://www.RegisterBlast.com/utdallas>) at least 72 hours in advance for each assignment (registration closes 72 hours before an assignment begins).
- You need to present your comet card to take the assignments.
- Registration to all assignments opens on the first day of the semester.
- More information can be found here: <https://ets.utdallas.edu/testing-center/students/>.

COVID-19 Guidelines and Resources

Classroom de-densification	For the first three weeks of the fall semester, in-person courses will be taught at a lower density. To accommodate this, students may choose to attend class synchronously via Microsoft Teams.
Recordings	All lectures will be recorded and be made available on Microsoft Teams.
Office hours	Office hours will be held online via Microsoft Teams during the first three weeks.
Resource	Check https://www.utdallas.edu/covid/ frequently for new updates.

More Policies

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.
Copyright notice	A UTD student is required to follow the UTD copyright policy. See http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm .