CSC/DSC 265/465 - Intermediate Statistical and Computational Methods - SPRING 2020

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LECTURES: TR 2:00-3:15pm (Wegman Hall 1400)

OFFICE HOURS: TBA

PREREQUISITES: Introductory calculus, linear algebra, introductory statistics (CSC262 or equivalent).

PRIMARY TEXT:

1. Lecture notes (PDF file available for download from Blackboard).
2. *An Introduction to Statistical Learning: with Applications in R* (1st Edition) G. James, D. Witten, T. Hastie and R. Tibshirani. (Springer Texts in Statistics). See www-bcf.usc.edu/~gareth/ISL/ for more information.

ADDITIONAL TEXTS: The following textbooks are not required for the course, but would be useful additional references.

1. *Modern Applied Statistics with S* (4th Edition) by W.N. Venables and B.D. Ripley, Springer.
2. *An Introduction to R.* William N. Venables, David M. Smith. Available at www.r-project.org (follow the Manuals link).
3. *Probability and Statistics for Engineering and the Sciences* (9th Edition). Jay L. Devore. Brooks/Cole.
4. *Probability and Statistics for Computer Science*. James L. Johnson. Wiley.

SOFTWARE: Students are advised to install the R statistical computing environment. The latest version is currently 3.6.2. This is available at www.r-project.org as free software under the terms of the Free Software Foundation's GNU General Public License in source code form. Precompiled binary distributions are also available for Windows, MAC OS X, and Linux OS (versions of archived precompiled distributions vary). An introductory manual *An Introduction to R* is listed above as an additional text.

COURSE WEBSITE: Course material and announcements will be posted on *Blackboard* at www.bb.urmc.rochester.edu. Registered students should already be enrolled in *Blackboard*.

COURSE MATERIAL: The course will cover intermediate statistical methodology with an emphasis on attaining expertise in the R statistical computing environment. Topics to be covered include linear regression, classification (logistic regression, Bayes theorem, diagnostics, ROC curves, linear and quadratic discrimination); simulation methods (cross validation, bootstrapping, permutation tests, MCMC); model selection; nonlinear models; unsupervised learning; Bayesian inference; Bayesian networks; mixture models; topics in R (advanced graphics, creating packages, bioconductor); survival analysis; optimization methods.

LECTURE SOFTWARE: Most lectures will feature software demonstrations. This software will be available on Blackboard before the lecture. Students are encouraged to run these demonstrations on their own computers during the lecture.

GRADING: There will be homework assignments every 2 weeks, a midterm examination, and a final examination, constituting 35%, 25%, and 40% of the course grade, respectively.

MIDTERM AND EXAM DATES: The midterm is scheduled for Tuesday March 17, during the normal lecture time. The final exam is tentatively scheduled for Friday, May 8, 4-7 PM, although this is subject to change.

GRADUATE STUDENT GRADING: This course is cross-listed as both an undergraduate and graduate level course. Graduate students will be given additional requirements in the form of extra questions on assignments. In addition, undergraduate and graduate students will be given separate midterms and exams, conforming to the more advanced expectations for graduate students.

ACADEMIC INTEGRITY: Undergraduate and graduate education at Rochester builds on the principle that excellence is achieved by exercising freedom in our scholarly and creative endeavors. Honesty and integrity are prerequisites of this freedom. Academic honesty in the advancement of knowledge requires that all students and instructors respect the integrity of one another's work and recognize the importance of acknowledging and safeguarding intellectual property.

Academic dishonesty is a serious violation of the trust upon which an academic community depends. The College Academic Honesty Policy is both an articulation of the kinds of behaviors that violate this trust and the means by which that trust is safeguarded and restored. For further information on the University of Rochester Policy on Academic Honesty, please visit the following website:

https://www.rochester.edu/college/honesty/

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: Students needing academic adjustments or accommodations because of a documented disability must contact the Disability Resource Coordinator for the school in which they are enrolled:

http://www.rochester.edu/eoc/DisabilityCoordinators.html