

MACF 491 (ACTU 491/STAT 380/MAST 679), Sec. H
Topics in Mathematical & Computational Finance - Statistical
Winter 2024

Instructor: Prof. F. Godin, Office: LB 921-05 (SGW), Phone: (514) 848-2424, Ext. 3494
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Office Hours: Tuesdays and Thursdays, 10:30-11:30.

Class Schedule: Tuesdays and Thursdays, 11:45-13:00.

Texts: *An introduction to statistical learning*, by G. James, D Witten, T. Hastie and R. Tibshirani, Springer. Available for free online at <https://statlearning.com/>

The elements of statistical learning, by J. Friedman, T. Hastie and R. Tibshirani, Springer series in statistics. Available for free online at <https://web.stanford.edu/~hastie/ElemStatLearn/>

Outline: This course is an introduction to statistical learning techniques. Some applications to finance and insurance will be illustrated. Topics covered include:

- Cross-validation
- Regression methods
 - Linear and non-linear models (GLMs, GAMs)
 - Variable selection methods
 - Shrinkage methods: ridge regression and LASSO
- Classification methods
 - K-nearest neighbors
 - Linear and quadratic discriminants
 - Logistic regression
 - Support vector machines
- Tree-based methods
- Variable importance and performance decomposition
- Unsupervised learning
 - Clustering: K-means, hierarchical clustering
 - Principal component analysis

Evaluation: The total score is determined according to the following rule:
Undergraduate students: assignments (25%), mid-term exam (26%), and final exam (49%).
Graduate students: assignments (15%), mid-term exam (26%), term project (10%), final exam (49%).

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

CIA Accreditation: This course is required to access the Capstone examination from the accreditation program of the Canadian Institute of Actuaries (CIA) under the University Accreditation Program (UAP).

Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: <https://www.concordia.ca/conduct/academic-integrity.html>" [Undergraduate Calendar, Sec 17.10.2]

Behaviour

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