

**Faculty of Science Course Syllabus
Department of Mathematics and Statistics
Intermediate Statistical Theory — STAT/MATH 3460
Winter 2018**

Instructor(s): Hong Gu hgu@dal.ca
Lectures: MWF 14:35–15:25 (LSC-COMMON AREA C206)
Laboratories: None
Tutorials: None

Course Description

This course provides an intermediate level coverage of statistical theory to provide a framework for valid inferences from sample data. The topics covered include sampling distribution, main methods for point estimation and their properties including bias, variance, mean squared error, consistency, efficiency, and MVUE; interval estimation for unknown parameters, including the mean, differences of two means, variances, and proportions; hypothesis test including Neyman-Pearson lemma, significance and power, likelihood ratio test and tests for mean, variance, contingency tables, and goodness-of-fit. Some basic Bayesian inference is also covered in this course.

Course Prerequisites

STAT/MATH 3360

Course Objectives/Learning Outcomes

- Derive the moment estimates and maximum likelihood estimates (MLE) for a probability model with one or two parameters, including for censored data.
- Understand and apply the knowledge of several properties of estimators, including unbiasedness, efficiency and consistency.
- Learn important sampling distributions including chi-square distribution, t distribution and F distribution.

- Derive the confidence intervals for means, difference between means, proportions, difference between proportions, variances and ratio of two variances based on the corresponding sampling distributions.
- Master the basic concepts in hypothesis testing, including type I error, type II error and power, and calculate the power function for the composite hypotheses.
- understand the concept of the most powerful test and derive the Neyman-Pearson Lemma.
- Use likelihood ratio test to derive the tests concerning means, variances, proportions, and tests for several binomial probabilities, multinomial probabilities, independence for contingency tables and goodness of fit test.
- Understand and apply the chi-square approximation for likelihood ratio statistics for simple and composite hypotheses.
- Understand the basic Bayesian inference and can calculate the posterior densities and the posterior predictive distributions for Normal, Binomial and Poisson models.

Course Materials

Textbook: “John E. Freund’s Mathematical Statistics with Applications”
(Eighth Edition) by Irwin Miller and Marylees Miller, published by Pearson

Course website: <http://www.mathstat.dal.ca/~hgu/Stat3460/>

Course Assessment

Component	Weight (% of final grade)	Date
Midterm Exam	30	26th February (in class)
Final Exam	55	Scheduled by Registrar
Assignments	15	8 assignments, approximately weekly

Other Course Requirements

Conversion of numerical grades to Final Letter Grades follows the

Dalhousie Common Grade Scale

A+	(90–100)	B+	(77–79)	C+	(65–69)	D	(50–54)
A	(85–89)	B	(73–76)	C	(60–64)	D	< 50
A-	(80–84)	B-	(70–72)	C-	(55–59)	D	(50–54)

Course Policies

Credit cannot be given for late assignments.

ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousies Student Accommodation Policy can be accessed here:

http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the Advising and Access Services Centre (AASC) prior to or at the outset of the regular academic year. More information and the Request for Accommodation form are available at www.dal.ca/access

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty. The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousies Policy on Intellectual Honesty and Faculty Discipline Procedures is available here:

http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general: The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and nonacademic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;

- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.

The full text of the code can be found here:

http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties	Killam Library Ground floor Rm G28 Bissett Centre for Academic Success	In person: Killam Library Rm G28 By appointment: - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	Killam Library Ground floor Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	Killam Library 3rd floor Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: sfs@dal.ca or - Simply drop in to see us during posted office hours All information can be found on our website: www.dal.ca/sfs
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field	Killam Library Ground floor Learning Commons & Rm G25	To make an appointment: - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email writingcentre@dal.ca - Book online through MyDal We are open six days a week See our website: writingcentre.dal.ca