

Arts and Science 2R03: Applied Statistical Inference Course Outline - 2019-2020 Term 2

Topics and Objectives:

Inferential statistics, with an emphasis on applications. Topics include data description, graphical methods, probability, confidence intervals, hypothesis testing, one-way ANOVA, and analysis of categorical data. The course includes the use of the statistics software package R.

The course objectives are to learn, exemplify and train the students on: (a) methods to summarize data numerically and graphically, (b) the most widely used statistical methods to draw inferences from observed data, (c) some of the mathematical details behind the methods, and (d) handling data and carrying out basic statistical analyses using the freeware statistical package R.

Course Web Page:

The course web page can be found on Avenue to Learn

Instructor:

Dr. David Lozinski HH/315, x23409, lozinski@math.mcmaster.ca

Office hours will be after class Monday 10:30-11:30 and Thursday 10:30-11:30, or by appointment.

In addition, my office hours for the grad program may be used, Tuesday at 2:30 and Thursday at 2:00.

Textbook:

Introductory Statistics - A Problem-Solving Approach by Stephen Kokoska, published by Macmillan Education. It is available at the Campus Store.

Lectures:

Classes are Mon and Thurs from 9:30am to 10:20am, and Tuesdays from 10:30am to 11:20am, in ABB 271

Tutorials:

There are two tutorial sessions:

T01 is Tuesdays at 9:30am in HH/102 with Zachary Levine (levinez@mcmaster.ca).

T02 is Mondays at 2:30pm in HH/102 with Daniel Van Veghel (vanveghe@mcmaster.ca).

Students are expected to attend their tutorial each week. Graded collaborative learning activities will be a part of the tutorials. The tutorials are also labs for the purpose of learning R, and working on assignments.

Mid-Term Tests:

There are 2 midterm tests, each worth 15% of the final grade. The dates for the midterms are tentatively Thursday, February 6 during class time (9:30-10:20am) in T13-123

Thursday, March 12 during class time (9:30-10:20am) in T13-123

More information, including the topics covered, will be announced in class.

Assignments:

There will be 5 assignments to be completed during the term. Assignments will make use of the statistical software R. R is freeware statistical software downloadable for Windows and MacIntosh platforms from

The R Project for Statistical Computing. The web page is

<http://www.r-project.org/>

R is also available on computers in campus computer labs.

The assignments will be due by noon on the Wednesdays of:

Jan 29, Feb 12, March 4, March 18, and April 1.

Late assignments will not be accepted and a grade of zero will be assigned.

Participation:

A portion of the final grade will be computed based on participation in collaborative learning activities done during the tutorials.

Project:

In addition to the above, a project consisting of a statistical analysis of appropriate data will be required. More information on the project will be presented in class.

Supporting Problems:

Supporting problems are listed on the web site. Answers to selected problems are in the back of the textbook.

Final Exam:

A 2.5 hour final exam will be scheduled and administered by the registrar in April. It will cover all course material.

Marking Scheme:

Two midterm tests	30% (15% each)
Final Examination	40%
Assignments	15% (5 at 3% each)
Project	10%
Participation	5%

Calculator: Only the standard Casio fx 991 ms or ms plus calculator is permitted.

Official Policies:

McMaster Policy on Academic Integrity: You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences - e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty, please refer to the Academic Integrity Policy, located at: <http://www.mcmaster.ca/academicintegrity>

The following illustrates only three forms of academic dishonesty:

- 1) Plagiarism - e.g., the submission of work that is not ones own or for which other credit has been obtained.
- 2) Improper collaboration in group work.
- 3) Copying or using unauthorized aids in tests and examinations.

**Requesting Relief for Missed Academic Term Work -
McMaster Student Absence Form (MSAF)**

In the event of an absence, students should review and follow the Academic Regulations in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work." Please consult the MSAF statement on our website (<https://arts.mcmaster.ca/current-students/requests-2/>) and direct any questions or concerns to Shelley Anderson or Madeline Van Impe in the Arts & Science Program Office.

Academic Accommodation of Students with Disabilities:

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. SAS can be contacted by phone 905-525-9140 ext.

28652 or email sas@mcmaster.ca. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

Please follow up with D. Lozinski to ensure a common understanding of how the specific accommodations will be met.

Academic Accommodation for Religious, Indigenous, or Spiritual Observances (RISO):

Students requiring academic accommodation based on religious, indigenous, or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office (i.e. to Shelley Anderson or Madeline Van Impe in the Arts & Science Program Office) normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Course modifications: The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L, and/or McMaster email. It is the responsibility of students to check their McMaster email and course websites regularly during the term and to note any changes. Announcements will be made in class and by using the course email distribution list.

Approximate lecture schedule:

Week 1: Jan 6 to Jan 10

- Intro, graphing data, Intro to R
- Chapters 1 and 2

Week 2: Jan 13 to Jan 17

- Measured statistics (including mean, percentiles, variance and std dev)
- Chapters 2 and 3

Week 3: Jan 20 to Jan 24

- Probability, from counts of equally likely outcomes, 3 axioms and basic laws
- Chapter 4

Week 4: Jan 27 to Jan 31

- Independence, conditional probability, discrete probability distributions
- Chapter 4

Week 5: Feb 3 to Feb 7

- Baye's Formula, Binomial and Poisson distributions
- Chapters 4 and 5

TEST 1

Week 6: Feb 10 to Feb 14

- Continuous Random variable, PDFs, normal distribution, exponential
- Chapter 6

READING WEEK: Feb 17 to Feb 21

Week 7: Feb 24 to Feb 28

- parameters from sample, dist of statistic, C.I. and t distribution
- Chapter 8

Week 8: March 2 to March 6

- Dist of sample proportion and C.I., C.I. for variance and Chi square
- Chapter 8

Week 9: March 9 to March 13

- Hypothesis testing, null alternative, test statistic, decision rule, error types
- Chapter 9

TEST 2

Week 10: March 16 to March 20

- Examples, 1 tail, 2 tail, Hypothesis testing on proportion, 2 sample means
- Chapters 9 and 10

Week 11: March 23 to March 27

- 2 sample means, examples. Categorical data, contingency tables
- Chapters 10 and 13

Week 12: March 30 to April 3

- Chi square test, test for homogeneity, intro to ANOVA
- Chapters 13 and 11

Week 13: April 6 and April 7

- Review