

Statistics 3859A (Regression) Course Outline

1. General Course Information

Lectures: MWF 1:30-2:30 PM, FNB (FIMS & Nursing Building) 3210

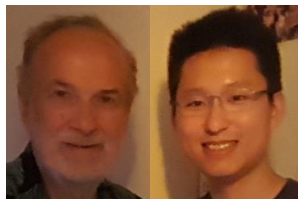
Tutorial: Tuesday 3:30-4:30 PM, WSC 55

Prerequisite Requirements

A minimum mark of 60% in [Statistical Sciences 2858A/B](#).

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information



A. I. McLeod & Yuanhao Lai

Instructor: Professor A. I. McLeod, Ph.D. (Waterloo, 1977)

Email: aimcleod@uwo.ca

Personal homepage: <http://fisher.stats.uwo.ca/faculty/aim/>

Office: WSC 235. Office Hours: 3-4PM MWF or by appointment.

Students must use their Western email addresses (@uwo.ca) when contacting me about administrative matters. Discussions and questions should be posed either in class, immediately after class, in the tutorial or office hours.

Tutorial Assistant: Yuanhao Lai

Email: ylai72@uwo.ca

3. Textbook & Course Description

Regression Modeling with Actuarial and Financial Applications by Jed Frees

We will discuss topics from this textbook that are listed in the SOA Syllabus for the SOA Statistics for Risk Modeling Examination. For details see: [LINK](#),

<https://www.soa.org/Education/Exam-Req/edu-exam-srm-detail.aspx>

For convenience the topics in the textbook which I plan to cover and shown in the Appendix.

The computing language/environment R/RStudio used in this course. RMarkdown must be used for producing reports in PDF format for the assignments.

The SOA RSM Exam also includes topics from another book ISLR (Introduction to Statistical Learning by James, Witten, Tibshirani and Hastie) which is covered in Statistics 4850G but since there is some overlap in the regression topics with our textbook this book also may be a useful resource. The ISLR book is freely available as a PDF on the web.

4. Course Materials

Laptop or personal computer with R/RStudio installed is highly recommended. Computers are also available in the Statistics Department Computing Lab (WSC 258).

Students should check OWL (<http://owl.uwo.ca>) on a regular basis for news and updates.

R scripts and datasets will be available from my homepage

<http://fisher.stats.uwo.ca/faculty/aim/2018/3859A/>

I am not able to provide practice problems for the final exam. My approach is that I will develop suitable questions to test our understanding of the topics discussed in class. This is more realistic to the expectations of employers when you are in a working environment and when you are expected to learn skills on the job.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Two Assignments	20%
Two Tests	30%
Final Exam	50%

Note: No calculators, electronic devices, notes or crib sheets will be allowed on tests or exams.

Tests: During tutorials: October 16 and November 13.

Assignment. Completed assignment must be uploaded to OWL 3859 Website. **No paper copies will be accepted.**

6. Accommodation and Accessibility

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in WSC 140, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's medical illness policy at

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see

http://www.registrar.uwo.ca/examinations/exam_schedule.html).

7. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

No electronic devices are permitted on quizzes or the final exam. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

8. Support Services

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation.

The policy on Accommodation for Students with Disabilities can be found here:

www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

This course is supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing paperwork in the Faculty of Science's Academic Counselling Office. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the chair of the department or email the Science Students' Council at ssc@uwo.ca.

Appendix. Textbook Coverage

1 Regression and the Normal Distribution Overview

Part I Linear Regression

2 Basic Linear Regression

2.1 Correlations and Least Squares

2.2 Basic Linear Regression Model

2.3 Is the Model Useful? Some Basic Summary Measures

2.4 Properties of Regression Coefficient Estimators

2.5 Statistical Inference

2.6 Building a Better Model: Residual Analysis

2.7 Application: Capital Asset Pricing Model

2.8 Illustrative Regression Computer Output

3 Multiple Linear Regression - I

3.1 Method of Least Squares

3.2 Linear Regression Model and Properties of Estimators

3.3 Estimation and Goodness of Fit

3.4 Statistical Inference for a Single Coefficient

3.5 Some Special Explanatory Variables

5 Variable Selection

5.1 An Iterative Approach to Data Analysis and Modeling

5.2 Automatic Variable Selection Procedures

5.3 Residual Analysis

5.4 Influential Points

5.5 Collinearity

5.6 Selection Criteria

5.7 Heteroscedasticity

6 Interpreting Regression Results

6.1 What the Modeling Process Tells Us

6.2 The Importance of Variable Selection

6.3 The Importance of Data Collection

Part II Topics in Time Series

7 Modeling Trends

7.1 Introduction

7.2 Fitting Trends in Time

7.3 Stationarity and Random Walk Models

7.4 Inference Using Random Walk Models

7.5 Filtering to Achieve Stationarity

7.6 Forecast Evaluation

8 Autocorrelations and Autoregressive Models

8.1 Autocorrelations

8.2 Autoregressive Models of Order One

8.3 Estimation and Diagnostic Checking

8.4 Smoothing and Prediction

9 Forecasting and Time Series Models

9.1 Smoothing with Moving Averages

9.2 Exponential Smoothing

9.3 Seasonal Time Series Models

9.4 Unit Root Tests

9.5 ARCH/ GARCH Models

Part III Topics in Nonlinear Regression

11 Categorical Dependent Variables

11.1 Binary Dependent Variables

11.2 Logistic and Probit Regression Models

11.3 Inference for Logistic and Probit Regression Models

11.4 Application: Medical Expenditures

11.5 Nominal Dependent Variables

11.6 Ordinal Dependent Variables

12 Count Dependent Variables

12.1 Poisson Regression

12.2 Application: Singapore Automobile Insurance

12.3 Overdispersion and Negative Binomial Models

12.4 Other Count Models

13 Generalized Linear Models

13.1 Introduction

13.2 GLM Model

13.3 Estimation

13.4 Application: Medical Expenditures

13.5 Residuals

13.6 Tweedie Distribution