

University of Guelph
Department of Mathematics and Statistics
College of Physical and Engineering Sciences
Campus: Guelph
Fall 2017

STAT*4360: Applied Time Series Analysis
STAT*6721: Stochastic Modelling

Credit Weight	:	0.50
Prerequisites	:	STAT*3240
Restrictions	:	None
Instructor Name	:	Peter Kim
Instructor Email	:	pkim@uoguelph.ca
Office Phone	:	(519) 824-4120 Ext. 58165
Office location	:	MACN515
Office hours	:	TTh 10:30-12 pm
Class Schedule	:	TTh 2:30-3:50pm
Location	:	MCKN 309
Final Examination	:	Dec 15, 2017 8:30-10:30 am

Course Texts:

Quantitative Trading with R, Harry Georgakopoulos, Palgrave.

- Required
- Available on course reserve (2 hour loan) in the library and bookstore

Time Series: A Biostatistical Introduction, P.J. Diggle. Oxford Science Publications, or,
Time Series Analysis With Applications in R, J.D. Cryer and K.S. Chan, Springer.

- Recommended
- First book available on course reserve (2 hour loan) in the library

Modern Applied Statistics with S, Fourth Edition, W.N. Venables and B.D. Ripley,
Springer

- Recommended
- Available on course reserve (2 hour loan and online) in the library

Course website: <https://courselink.uoguelph.ca/shared/login/login.html>

Online discussion boards

- Online discussion boards will be available on courselink.

- They are only to be used for course-related matters.
- Students are encouraged to help each other understand concepts - Discussion boards will be monitored for accuracy and content.

Calendar Description :

This course will investigate the nature of stationary stochastic processes from the spectral and time domain points of view. Aspects of parameter estimation and prediction in a computationally intensive environment will be the presentation style. The methods developed in this course will have applicability in many sciences such as engineering, environmental sciences, geography, soil sciences, and life sciences.

Course Description :

This course will be on applied time series analysis. We will primarily be investigating time series models in both the frequency and time domain with particular application to financial time series. Frequency domain, or spectral analysis is useful for extracting global features of a given time series, where in fact what we would like to deduce is whether or not a given time series is white noise, a completely random process. Time domain analysis is the actual modelling aspect of time series where the main tool is parameter estimation of an autoregressive moving average process. Frequency and time domain analyses come together in that after parameter estimation is complete in the time domain, frequency domain analysis can tell us whether residuals have been reduced to white noise which is the most we can expect.

Time series computation will be heavily used in this course. The statistical software package R will be utilized. All students will be required to have access to R. Details will be provided in class.

Course Evaluation:

Assignments (60 %)

Assignment 1	Oct 6 (Fri)	In-class
Assignment 2	Oct 20 (Fri)	In-class
Assignment 3	Nov 3 (Fri)	In-class
Assignment 4	Nov 17 (Fri)	In-class
Assignment 5	Dec 1 (Fri)	In-class

Each student will be expected to do a short presentation in class during the semester.

Final Exam (40%)	Dec 15	8:30-10:30am	TBA
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Course Content

Lecture Schedule

Week 1	Sep 12 & 14	Introduction to financial time series
Week 2	Sep 19 & 21	Spreads, Risk and Betas
Week 3	Sep 26 & 28	Spreads, Risk and Betas
Week 4	Oct 3 & 5	Spreads, Risk and Betas -Assignment 1 due Fri Oct 6
Week 5	Oct 12	ARMA models -No class Tues Oct 10 (Thanksgiving),
Week 6	Oct 17 & 19	ARMA models -Assignment 2 due Fri Oct 20
Week 7	Oct 24 & 26	ARIMA models
Week 8	Oct 31 & Nov 2	ARIMA models -Assignment 3 due Fri Nov 3
Week 9	Nov 7 & 9	Other models
Week 10	Nov 14 & 16	Time Series Models -Assignment 4 due Fri Nov 17
Week 11	Nov 21 & 23	Transfer function modeling
Week 12	Nov 28 & 30	Transfer function modeling -Assignment 5 due Fri Dec 1
Final Exam	Dec 15	8:30-10:30am, TBA

Course Policies

Grading Policies

Assignments

- Homework assignments will be posted on the course website and will be collected for grading.
- Students will also be expected to do a short presentation of their work.

Assignments and Final

- There are five assignments with specific objectives for each of them. The assignments are expected to be electronically written and submitted in good presentation style.
- A Final Exam will take place on Friday December 15, 8:30-10:30 am.
- Students who would like academic accommodations should contact the Student Accessibility Services (SAS) regarding the final exam at the SAS Exam Centre.
- If a student is unable to complete an assignment due to valid documented reasons, please provide the instructor with this documentation. The weight of the missed assignment will be added to the final. Otherwise a student will receive a mark of zero for the missed assignment.

Course Policy on Group Work:

- Students are allowed and encouraged to work together on assignments and to use the online discussion board on courselink to help each other out.

Course Policy regarding use of electronic devices and recording of lectures

- Electronic recording of classes is expressly forbidden without consent of the instructor.
- When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

University Policies

E-mail Communication

As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. [See the](#)

[undergraduate calendar for information on regulations and procedures for Academic Consideration.](#)

Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or

faculty advisor. [The Academic Misconduct Policy is detailed in the Undergraduate Calendar.](#)

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.