University of Guelph
Department of Mathematics and Statistics

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

Course Outline
Fall 2015

Instructor Information

Instructor Name	:	Peter Kim
Instructor Email	:	**pkim@uoguelph.ca**
Office Phone :		(519) 824-4120 Ext. 58165
Office location	:	MACN515
Office hours	:	MW 10:30-12pm

General Information

Class Schedule	:	MWF 2:30-3:20pm
Location	:	MCKN 226
Campus	:	Guelph
Credit Weight	:	0.50
Prerequisites	:	STAT*3240
Restrictions	:	None

Course Description :

This course will be on time series analysis. We will primarily be investigating time series models in both the frequency and time domains. 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 modeling 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 heavily utilized. All students will be required to have access to R. Details will be provided in class.

Course Content
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Lecture Schedule

Week 1	Sep 14	Introduction to time series
Week 2	Sep 21	Stationary Processes
Week 3	Sep 28	Spectral Analysus
Week 4	Oct 5	Spectral Analysis -Assignment 1 due Fri Oct 9
Week 5	Oct 12	Autoregressive moving average models -No class Mon Oct 12 (Thanksgiving), classes resume Oct 14
Week 6	Oct 19	Autoregressive moving average models -Assignment 2 due Fri Oct 23
Week 7	Oct 26	Smoothing the periodogram
Week 8	Nov 2	Smoothing the periodogram -Assignment 3 due Fri Nov 6
Week 9	Nov 9	Autoregressive integrated moving average models
Week 10	Nov 16	Autoregressive integrated moving average models -Assignment 4 due Fri Nov 20
Week 11	Nov 23	Transfer function modeling
Week 12	Nov 30	Transfer function modeling -Assignment 5 due Fri Dec 4
Final Exam	Dec 18	7:00-9:00 pm, TBA

Course Evaluation:

Assignments (60 %)

Assignment 1	Oct 9 (Fri)		In-class
Assignment 2	Oct 23 (Fri)		In-class
Assignment 3	Nov 6 (Fri)		In-class
Assignment 4	Nov 20 (Fri)		In-class
Assignment 5	Dec 4 (Fri)		In-class

Final (40%)

| Final Exam | Dec 18 | 7:00-9:00 pm | TBA |

Course Resources

Course Texts:

Time Series: A Biostatistical Introduction, Peter J. Diggle. Oxford Science Publications.
- 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
- Available on course reserve (2 hour loan and online) in the library

Quantitative Trading with R, Harry Georgakopoulos, Palgrave.
- Available on course reserve (2 hour loan) in the library and bookstore

Other Resources:

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.

Course Policies
Grading Policies

Assignments
- Homework assignments will be posted on the course website and will be collected for grading.

Assignments and Final
- There are five assignments.
- A Final Exam will take place on Friday December 18, 7-9 pm.
- Students who would like academic accommodations should contact the Centre for Students with Disabilities (CSD) regarding the final exam at the CSD 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

Academic Consideration

- When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact.
- See the academic calendar for information on regulations and procedures for academic Consideration:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

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:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Accessibility

- The University of Guelph is committed to creating a barrier-free environment.
- Providing services for students is a shared responsibility among students, faculty and administrators.
- This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.
- For more information, contact CSD at 519-824-4120 Ext. 56208 or email csd@uoguelph.ca or see the website: https://www.uoguelph.ca/csd/

Course Evaluation Information
- Course evaluations will occur in class some time in November or December.

Drop date
- The last date to drop one-semester courses, without academic penalty, is November 6, 2015 (Fortieth day of classes).
- For regulations and procedures for Dropping Courses, see the Academic Calendar: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Important dates
- Please see the schedule of date for the full list of important dates: https://www.uoguelph.ca/registrar/calendars/undergraduate/2014-2015/c03/c03-fallsem.shtml

Additional Course Information

Advice:
- The material is cumulative so do not fall behind.
- As a general guideline, I expect students to spend about six or seven hours per week (in addition to lectures) reading the text book, reviewing lecture notes, doing assignment problems, and studying.

Expectations of students:

- Work hard
- Maintain academic integrity

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08amisconduct.shtml/
Academic misconduct is an extremely serious offence at the university level with penalties including suspension and expulsion. Students caught in acts of academic misconduct will be reported to the Dean of the college and can expect a severe punishment.
If a student is found guilty of an act of academic misconduct they will have a disciplinary notice placed on their transcript.

- Be respectful of the instructor and your fellow students

It is considered extremely rude and disruptive to talk during lectures.
Turn off your cell phones, do not take phone calls during lecture and set the volume of your laptop or tablet to mute.
If you plan on using your laptop or tablet in class, make sure that you only use it to look at material posted on the courselink website. It is distracting for other students if you use it for activities such as visiting Facebook, Twitter, Instagram and other social media websites, watching YouTube videos, streaming movies or TV shows using services such as Netflix etc.
In general use common sense and make logical decisions regarding your behaviour in lecture. There are always students who attend lecture to learn the course material. Do not be selfish and obstruct other students from leaning.

Be aware of and follow the University of Guelph's student code of conduct

https://www.uoguelph.ca/registrar/calendars/undergraduate/2012-2013/c14/c14-strightsrespon.shtml
Lack of knowledge regarding the rules is not an acceptable excuse for breaking them.
- Utilize available resources to reach your full potential in this course

Attend lectures
Discussion boards on courselink
Feel free to ask your instructor for help