



Faculty of Arts and Science Course Syllabus
Department of Statistical Sciences
Time Series Analysis
STA457H1 (STA2202H1)
Summer 2022

Instructor: Sean Sexton (sta457@utoronto.ca)
Class Day/Time: Monday/Wednesday 6:00pm-9:00pm EST
Office Hours: Will be posted and updated regularly on Quercus
Teaching Assistants TBD

1. Course Content

This course serves as an introduction to univariate and multivariate time series analysis. The course will cover both theoretical and empirical aspects of time series analysis, making extensive use of the R statistical software. Majority of the course content and important announcements will be uploaded and posted to Quercus, so please check it frequently. The course will cover the following topics:

- Theory of stationary processes
- Time series regression and applications
- Elements of inference in time domain
- ARMA/ARIMA models
- Forecasting
- Heteroskedastic Models (e.g. ARCH/GARCH)

There will be a focus on proper model development techniques observed in the workforce. If time permits, other topics such as bootstrapping, spectral analysis, state-space models, or machine learning techniques in time series will be covered.

2. Course Assessment

The course will assess theoretical questions, critical thinking, and applied R programming. The ability to clearly and concisely explain and interpret results will also be assessed. Further details on the assessments will be provided in class and posted on Quercus well in advance of the due date.

Assessment	Weight	Due Date
Midterm Exam (x2)	40% (20% each)	July 18 th , August 8 th , 2022 (1.5 hours at the beginning of class).
Projects (x2)	20% (10% each)	Due July 29 th , Aug 15 th , 6pm ET.

Final Exam	40%	2-hour exam TBD by FAS (sometime Aug. 17 th -25 th).
------------	-----	---

3. Course Materials

3.1. Textbooks

The required textbook for this course is:

Time Series Analysis and Its Applications, with R Examples, 4th Edition, by R.H. Shumway and D.S. Stoffer
ISBN 978-3-319-52451-1
ISBN 978-3-319-52452-8 (eBook)

This textbook can be found at the UofT library, or you can purchase your own copy online. Material is also drawn from the following textbooks:

Time Series Analysis, with Applications in R, 2nd Edition, by J.D. Cryer and K.S. Chan
Forecasting Principles and Practice, 2nd and 3rd Edition, by R.J. Hyndman and G. Athanasopoulos
The Analysis of Time Series, An Introduction with R, 7th Edition, by C. Chatfield and H. Xing

3.2. Statistical Software

We will be using the statistical software R throughout the course. R is a free software that can either be downloaded onto your personal computer or used in the cloud. It is recommended that you use RStudio, which is a commonly used free integrated development environment for R. You can download R at <http://cran.r-project.org>. RStudio can be downloaded at <http://www.rstudio.com>. There is also a cloud-based version of RStudio (JupyterHub). You can access this with your UTORid and password at <http://jupyter.utoronto.ca>. It is required that projects be submitted using a reproducible RMarkdown (.rmd) file with the underlying code as well as a knitted RMarkdown document. You can learn more about RMarkdown at <https://rmarkdown.rstudio.com>.

4. Course Policies

1. **Late/Missed Work:** There are no extensions available for projects. Late projects will be accepted but are subject to a 20% penalty per day late. Late submissions will not be



allowed 48 hours past the due date. Note that the first 20% penalty begins one minute after the deadline. It is best to submit projects well in advance to allow for unforeseen issues that might arise (internet, power outage, etc.). There will be no make-ups for quizzes, midterms, or projects. It is your responsibility to properly inform the instructor when you declare any absence from academic work, whether for medical or non-medical reasons. The instructor will confirm these absences with the department. Final exam conflicts and petitions for a deferred exam must be brought to the Faculty of Arts and Science, not your instructor. Information on how to request a deferred exam due to illness or another valid reason is available at: <https://www.artsci.utoronto.ca/current/faculty-registrar/petitions/deferred-exams>. If a student has properly declared their absence from academic work, the weight of a missed midterm or project will be shifted to the final exam.

2. **Re-evaluation:** Any requests to have marked assignments/quizzes/exams re-evaluated must be made in writing by email within 48 hours after the grades are released. The request must contain justification for consideration. Be sure to include your official name and student number for identification purposes. The teaching team should process regrading requests within two weeks of the requested date. Please note that the teaching team reserves the right to review the entire assessment in question. Hence, your mark may go down, up, or remain the same.
3. **Communication:** For questions regarding the course and material, please use Quercus discussions to discuss with your peers. TA's are not available via email and outside office hours. When necessary, please use the course email (sta457@utoronto.ca), which will be monitored by the instructor and/or TA's. Please allow at least two days for a response.
4. **Office Hours:** There will be approximately 2-3 hours of availability for office hours per week. The time and location of office hours will be posted on Quercus.
5. **Academic Integrity:** While collaborating, learning, and studying with peers is encouraged, work submitted should be your own. Any form of plagiarism or cheating on an assessment will result in a grade of 0% and further escalation. Trivial or mechanical changes to someone else's work and submitting that work under your name is prohibited. This includes copying from solutions provided to previous semesters of this course. Please read the University of Toronto's Code of Behaviour on Academic Matters available [here](#). This type of behavior is a huge academic offence, so please respect UofT's expectations and refrain from this type of behavior.