

STA457H1 F

Time Series Analysis

Summer 2025 Syllabus

Course Meetings

STA457H1 F

Section	Day & Time	Delivery Mode & Location
LEC5101	Monday, 6:00 PM - 9:00 PM	Online Synchronous
	Wednesday, 6:00 PM - 9:00 PM	Online Synchronous

Refer to ACORN for the most up-to-date information about the location of the course meetings.

Course Contacts

Instructor: Dr Lijia Wang

Email: lijialj.wang@utoronto.ca

Office Hours and Location:

Regular Office Hour: Each time after class (Roughly Monday, Wednesday: 8:30 - 9:00 PM).

Two special in-person sessions: May 26th (Monday of the 4th week; before midterm test) 7:00 - 9:00 PM and June 11th (Wednesday of the 6th week; before final exam) 6:00 - 9:00 PM at BF 315

Lead TA: Quin Xie quin.xie@mail.utoronto.ca

Regular TAs:

Vedant Choudhary vedant.choudhary@mail.utoronto.ca

Madhu Gunasingam madhu.gunasingam@mail.utoronto.ca

Course Overview

An overview of methods and problems in the analysis of time series data. Topics include: descriptive methods, filtering and smoothing time series, theory of stationary processes, identification and estimation of time series models, forecasting, seasonal adjustment, spectral estimation, bivariate time series models.

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Prerequisites: STA302H1/STAC67H3/STA302H5;
MAT235Y1/MAT237Y1/MAT257Y1/(MATB41H3, MATB42H3)/(MAT232H5,
MAT236H5)/(MAT233H5, MAT236H5)

Corequisites: None

Exclusions: STAD57H3, STA457H5

Recommended Preparation: None

Credit Value: 0.5

Course Materials

Textbook:

R. Shumway and D. Stoffer: \textit{Time Series Analysis and Its Applications with R Examples} (4th edition). Springer.} This book is available at the University of Toronto Bookstore and also available online via the University of Toronto Library system;

D. Montgomery, C. Jennings, and M. Kulahci: \textit{Time Series Analysis and Forecasting} (2nd edition)} (optional).

Marking Scheme

Assessment	Percent	Details	Due Date
Midterm Test	20%	There will be one term test during the course with a time limit of 90 minutes. The schedule for the term test: \ Date: Wednesday May. 28th at 6:00 - 8:00 PM Location: EX (Exam Center) 100 The term test is an in-person timed assessment. By enrolling in this course, you are affirming that you are available on campus during the test time slot.	2025-05-28
Group Project	20%	There will be a group project for this course. Students are expected to form groups of 3–4 members. In special cases, groups of 2 may be permitted, depending on the total enrollment. For the project, students will given a time-series-related topic and perform a statistical analysis. The final deliverable should be a well-written, professionally formatted report. Detailed project instructions will be provided later.	No Specific Date
Assignment 1	8%		2025-05-12
Assignment 2	8%		2025-05-21
Assignment 3	8%		2025-06-09
Self reflection and Peer evaluation	6%	The group project will include 6 marks of individual contributions. The marks will be awarded based on self-reflection and peer evaluations, reflecting each individual's contribution to the project. Details will be given at a later date.	No Specific Date
In-Person Final Exam	30%		Final Exam Period

Assessment	Percent	Details	Due Date
Participation	10%* bonus	Since this course is delivered online, encouraging active participation can be challenging. To address this, and in accordance with departmental guidelines, 10 bonus marks are allocated for participation. Students will earn 0.5 mark for each instance of active participation during class, such as asking questions or engaging in discussions with the instructor or peers. If a student also turns on their camera while participating, they will earn 1 mark for that instance. Additionally, students who attend office hours and ask questions—whether during the online session after class or the special in-person session—will receive 0.5 mark per visit.	

Late Assessment Submissions Policy

See below for a more detailed explanation of the policy regarding missed assessments and possible extensions for each assessment:

Missed Term Test: Students who miss the term test with valid documentation or an approved absence declaration will have the opportunity to shift the weights to the final exam. There will not be make-up tests. Alternatively, if the test is missed without valid reasons and/or no valid documentation or an approved absence declaration is provided, a score of zero will be given.

Missed Assignments: If the assignment is missed due to valid reasons stated above and valid documentation or an approved absence declaration is provided, the weight of the missed assignment will be shifted to the final project. Alternatively, if the assignment is missed without valid reasons and/or no valid documentation or an approved absence declaration is provided, a score of zero will be given. Students will be given enough time to work on the assignment, so late submission will not be accepted.

Missed Final Exam: If you are not able to attend your final exam at the scheduled time for reasons outside your control, you may submit a deferred exam petition, which is a request to write your exam at a later time. Please see the Faculty of Arts and Science Deferred Exam policy for more information.

For a missed term test, students must provide valid documentation such as the Verification of Illness or Injury. For more information, Please check <https://www.artsci.utoronto.ca/faculty-staff/teaching/academic-handbook#2023-24-updates-accordion-3>. ONCE per semester, each student is allowed to miss work without any documentation. In that case you must fill out the ACORN absence declaration form. The form can be used at most ONCE per semester (once in

total for all of your courses, not once per course). The absence you declare can be for a maximum of 7 consecutive days. In the case that a student needs other accommodation, please obtain the Letter from the College Registrar, Letter of Academic Accommodation from Accessibility Services, etc.

Course Schedule

Week	Description
Class 1 May. 05	Course Introduction, Characteristics of Time Series
Class 2 May. 07	Classic Approach, ETS models
Class 3 May. 12	Stationary, ACF, Backshift Operator
Class 4 May. 14	AR processes, MA processes
Class 5 May. 19	ARMA models, Causality and Invertibility
Class 6 May. 21	ARMA models, PACF
Class 7 May. 26	Forecasting, Estimation
Class 8 May. 28	Mid-term Test
Class 9 Jun. 02	ARIMA models, SARIMA Models
Class 10 Jun. 04	ARCH models, GARCH models
Class 11 Jun. 09	Spectral Analysis

Class 12 Jun. 11	Machine Learning models, other topics
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Policies & Statements

Re-marking Policies

The course re-mark policy exists to correct mistakes and any request should clearly identify the error (for example, a question that was not marked, or a total incorrectly calculated). Requests to correct such mistakes must be sent by email to the course email address. Before you request for a re-mark, please make sure you review the solutions posted in Quercus.

To be considered for a re-mark, the email should include student's full name and ID number, and give a specific, clear, and concise reason for each request, referring to a possible error or omission by the marker. %Remarking requests without a specific reason will not be accepted. Students should make such requests as soon as reasonably possible after receiving the work back, but no later than 1 week after it was returned.

Note that if a student requests for a re-mark, the entire term test may be re-marked so the new grade may go up, down, or remain the same.

Piazza

Piazza will be used for discussions. This is for student-led discussion. The TAs will check Piazza posts on a regular basis and might participate in discussions. All posts and conduct on Piazza must remain professional. Posts regarding personal matters such as inquiries about grades, reporting absences, regrade requests, etc. should be communicated via email and NOT be posted on Piazza. Piazza is intended for students to receive support regarding course information and content and thus should be an overall positive and professional environment. Postings that do not align with this environment will be removed.

Email

Email is appropriate for personal questions. Before you send an e-mail, make sure that you are not asking for information that is already on the course outline/ website/announcements, or questions about the course material that are more appropriately discussed during office hours or lectures. For personal matters, contact the course email with your U of T email address. The subject line must contain the course number, lecture section number, and a relevant subject (indicating what the email is about). Be sure to include your full name and student number in the body of the message. You will not get a response if you email from other email addresses or do not follow the email policy.

Privacy and Use of Course Materials Notifications:

Course materials belong to your instructor, the University, and/or other source depending on the specific facts of each situation and are protected by copyright.

In this course, you are permitted to download session materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor. For questions about recording and use of videos in which you appear please contact your instructor.

Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. For my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as a test or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Students with Disabilities or Accommodation Requirements

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting <https://studentlife.utoronto.ca/departments/accessibility-services/>. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the [Code of Behaviour on Academic Matters](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019) (<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at <http://www.writing.utoronto.ca>. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see [A&S Student Academic Integrity](https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) (<https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>) and the [University of Toronto Website on Academic Integrity](https://www.academicintegrity.utoronto.ca) (<https://www.academicintegrity.utoronto.ca>).

Specific Medical Circumstances

If you become ill and it affects your ability to do your academic work, consult me right away. Normally, I will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form. The VOI indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. If you cannot submit a VOI due to limits on terms of use, you can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI (including dates, academic impact, practitioner's signature, phone and registration number). For more information on the VOI, please see <http://www.illnessverification.utoronto.ca>. For information on Absence Declaration Tool for A&S students, please see <https://www.artsci.utoronto.ca/absence>. If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.

Accommodation for Personal Reasons

There may be times when you are unable to complete course work on time due to non-medical reasons. If you have concerns, speak to me or to an advisor in your College Registrar's office; they can help you to decide if you want to request an extension or other forms of academic consideration. They may be able to email your instructors directly to provide a College Registrar's letter of support and connect you with other helpful resources on campus.