Course Syllabus
EC 665 A – Forecasting, Time Series Analysis, and Survey Design
Lazaridis School of Business and Economics, Department of Economics, Waterloo
Winter | 2025

Course Information

Instructor:	Dr. Stephen Snudden
Lectures:	Mondays and Wednesdays, 10:00 – 11:20 a.m., P118
Office hours:	Mondays and Wednesdays, 11:30 – 12:30 p.m., LH3022.
Phone:	None (only email)
Email:	ssnudden@wlu.ca (use EC665 in subject, do not email via MyLS)
Tutorials:	Fridays 9:30-11:00 a.m. in in EC3096
URL:	https://mylearningspace.wlu.ca/ (use your Novell login)

Course Overview

This graduate-level course will equip you with the skills and knowledge to tackle real-world economic challenges through cutting-edge forecasting and structural econometric techniques. Forecast topics include recursive and direct forecasts, mixed frequency sampling, machine learning, and the application of big data techniques. Structural econometric identification includes structural vector auto-regressions, high-frequency identification, and local projections. Special focus will be given to recent advances in aspects of temporal aggregation.

This is a project-based course in time series econometric methods. Each student will develop a unique time series dataset, serving as a real-world case study throughout the semester that will accumulate into a final research project. Linear algebra and statistics will used extensively throughout the course. Students will be taught and are expected to gain competency in statistical programming. Stata and R code will accompany all course topics. Python may also be used.

Course Materials

- There is no required textbook for this class.
- The lecture notes are required reading. Additional, reading materials will be posted on MyLS and are required reading.
- Students must bring a laptop with Stata to class. You are welcome to access software via a remote desktop connection.
- Stata 17 is required. I recommend at least a 1-year licence as Stata will likely be used for other courses and your masters research paper (MRP). https://www.stata.com/. Note that Stata 16 is available on remote desktops at WLU.
- Python, as well as R and RStudio are recommended. The software is open access.

Cost of materials: 1 year Stata/BE $94 USD
(https://www.stata.com/order/new/edu/profplus/student-pricing/)

MyLearningSpace

This course is partially administered through MyLearningSpace (MLS). The title of the course on MLS is *EC-665A-Forecasting, Time Series Analysis, and Survey Design.* MLS contains all course content: syllabus, lecture notes, notifications, assignments, quizzes, and surveys. Check the website frequently for important announcements.

Course Delivery

This course is delivered in person. In addition to lecture materials, class time will also be spent to review practice questions for the exams, discuss solutions to assignments and midterms, give advice for the assessments, and answer student questions.

Course Evaluation

Item	**Weight**	**Due Date**
Survey Participation	3%	End of first and last month
Forecast Competitions	10%	Biweekly
Online Quizzes	10%	Biweekly
Assignments	32%	Feb. 2nd, by 6 p.m. March. 2nd, by 6 p.m. March 30th, by 6 p.m.
Final Presentation	5%	April 8th, by 6 p.m.
Final Project	40%	April 20th, by 6 p.m.
Total	**100%**	

Note, winter term reading week is February 16–22, and there are no lectures, tutorials, or office hours. The last day of class is April 9th.

Assignments

Three assignments will be posted on MyLearningSpace a couple of weeks before the due date. Assignment will be worth 32% of the course grade and include both a group component and an individual component. Assignments are due by 6 p.m. on the due date.

The assignments' exercises are designed to prepare students for being applied econometricians and independent thinkers. The assignments from the semester develop the data and programs needed for the final project.

Assignments from early in the semester will have a larger share devoted to the group questions whereas the later assignments will have a higher share devoted to individual questions. For the group component, students *must* work in a group with 2 people. The individual component must be completed on your own and handed in separately.

Assignments will be handed in to MyLearningSpace in *pdf* format. Late assignments and those submitted in a non-PDF format will *not* be accepted. If *all three* assignments are completed and submitted, the assignment with the lowest grade will *automatically* be excluded and the weight will be transferred to the other assignments.

Mandatory Participation

There will be two online surveys (1 grade point each total) to be posted on MyLearningSpace. The surveys must be *submitted to count* as it is not possible to have *deadline extensions*. Be careful to press the submit button after editing as I cannot see surveys that have been filled out but not submitted. If you edit and submit but then change answers, MyLS will withdrawal your submission and you need to press the submit button again.

You are required to attend office hours at least twice (worth 1 grade point total) to discuss the research for the final project.

Forecast Competition

Every two weeks you are required to submit a forecast of some variable that has yet to be realized. You must work alone. Be cautious about working and sharing code with others, your code and forecasts cannot be similar to others, or you will risk plagiarism. The code and data for the forecast must be provided upon submission. The object being forecasted will vary depending on the week but will include nowcasts and forecasts of CPI, interest rates, exchange rates, and commodity prices. The schedule of data releases, consensus forecasts, and variables of interest can be found at https://tradingeconomics.com/calendar. In addition to the grades for participation, a school pen will be awarded to anyone that gets the closest forecast. Extra prizes will be awarded if you beat the consensus forecast!

Tutorial Participation and Presentation

You are required to attend weekly tutorials. The time will be used to learning programming of the materials covered in the course and work on assignments and forecasts. The TA will be available for support with teaching and debugging code.

Bonus Participation Grades

There will also be bonus participation grades awarded by completing extra coding assignments that will be posted on MLS (up to 5 additional grade points). These assignments involve either: translating the provided Stata code into R or Python; developing code to expand the application of a topic. Code created will be made available to other students. The purpose of these bonus points is to develop your skills in a variety of statistical software and increase the resources available to all students.

There will also be bonus participation grades available for completing the MABE Career Development Certificate (up to 5 additional grade points). This involves participating in workshops and completing tasks to start your job search. More information on the certificate will be made available.

Extra grade points may be awarded for volunteering and exceptional contributions in class.

Quiz

Biweekly quizzes, worth 10 grade points total, will take place outside of class time. The quiz will be posted on MyLS, on Wednesday afternoons and be due CoB Sunday. The quizzes are open book and include examination of the key concepts covered in the lectures and assignments, including applied concepts, and interpretation of results and graphs. The lowest quiz grade will be dropped from the calculation of the total quiz grade if all quizzes are written.

Tentative Course Outline

	Sections	**Topics (non-inclusive)**
1	Statistical Review	Modelling; Bias and Consistency; MLE and OLS; Model Fit; Hypothesis Testing
2	Time Series Modelling	Time Dependency; Common Time Series; Autoregressive Moving Average (ARMA); Impulse Response Functions; Box-Jenkins Method
3	Measurement	Terminology; Latent and Observable Variables; Modelling Choice and Stationarity; Breaks; Seasonality; Growth Rates; Statistical Filters; Spectral Frequencies
4	Forecasting	Forecast Terminology; Direct and Recursive Forecasts; Statistical Forecast Evaluation; Benchmark Models; Density Forecasts; Real-Time Methods
5	Forecast Evaluation	Random Walk Hypothesis; Testing Forecast Equality; Economic Forecast Criteria; Forecast-Based Trading
6	Mixed Frequency Models	Temporal Aggregation and Forecasts; Restricted and Unrestricted MIDAS; Bottom-up Forecasts
7	Big Data Techniques	Forecast Averaging; Principal Component Analysis; Factor Models; Dynamic Factor Models; LASSO; Elastic Net; Bayesian variable-selection
8	More Machine Learning	Machine Learning Terminology; Trees; Random Forests; Boosting; Neural Networks
9	High-Frequency Identification	High-Frequency Identification; Local Projections; IV Local Projections; Narrative Identification
10	Structural VARS	Short and Long-run Identification; Structural Impulse Responses; Block Recursivity; Proxy VARs
11	Panel Data	Household-level Analysis; Firm/Country-level Analysis; Fixed and Random Effects; Using Survey Data

Note: Reading materials and supplementary resources will be provided on MyLS. Material may be skipped or added. Updates will be provided in class and MyLS.

Final Project

The final project requires you to conduct an empirical examination that contributes to an economic or finance question. The topic for the final project is your choice and must be discussed in office hours with the professor at least twice. The method used will vary by student, as it should be the best method to answer your economic question. The deliverable is a ten-page written report, not including the references. The final project is independent, and you are not permitted to work in groups. The project can be an extension of a time series application explored in class, such as a forecast exercise, a structural study, or a replication of published research. The methods, data, and the programs used for the final project will be developed in the assignments. Complete details and a template for writing the paper are provided on MyLS.

Final Presentation

The presentation is due a week before the final project is due. The presentation is to encourage you to have results before classes end, practice describing methods and findings, and to receive feedback. The presentation will be recorded on Zoom in your own time and will be submitted by providing the link via MyLS. Presentations are to be 5 minutes in length. In addition to feedback from the professor, you will receive feedback from peers if your presentation is shown on the last day of class. More information will be provided on MyLS.

Academic Misconduct

Laurier is committed to a culture of integrity within and beyond the classroom. This culture values trustworthiness (i.e., honesty, integrity, reliability), fairness, caring, respect, responsibility and citizenship. As a Laurier student you are responsible for familiarizing yourself with this policy and the accompanying penalty guidelines, some of which may appear on your transcript if there is a finding of misconduct. For information on categories of offenses and types of penalty, please consult Laurier's academic integrity website. Ignorance is not a defense. If you need clarification of aspects of University policy on Academic and Research Misconduct, please consult your instructor. *Software will be used to check for plagiarism on assignments.* Students will be required to submit their written work in electronic form to have it checked for plagiarism.

Academic Misconduct - What This Means in Practice

- Assignments and projects will be automatically checked for plagiarism.
- Individual sections of the assignment must not have any related material to other students. Do not split up groups once you have shared material or you risk having answers that are too similar.

Intellectual Property

The educational materials developed for this course, including, but not limited to, lecture notes and slides, handout materials, examinations and assignments, and any materials posted to MyLearningSpace, are the intellectual property of the course instructor. These materials have been developed for student use only and they are not intended for wider dissemination and/or communication outside of a given course.

- *Posting or providing unauthorized audio, video, or textual material of lecture content to third-party websites violates an instructor's intellectual property rights, and the Canadian Copyright Act.*
- *Recording lectures in any way is prohibited in this course unless specific permission has been granted by the instructor.*

Failure to follow these instructions may be in contravention of the university's Code of Student Conduct and/or Code of Academic Conduct, and will result in appropriate penalties. Participation in this course constitutes an agreement by all parties to abide by the relevant University Policies, and to respect the intellectual property of others during and after their association with Wilfrid Laurier University.

Intellectual Property- What This Means in Practice

- You may not record the lectures with video or audio unless you have asked and received permission from the instructor ahead of time, each time.

- The instructor will be happy to accommodate if appropriate, i.e. record material not otherwise available, just let them know.
- You may take pictures of written lecture notes or excel examples at any time for personal use.
- If you post the instructor's material anywhere online, the instructor can often see who posted it. The instructor has access to these materials through copyright laws and regularly removes them.

Illness Accommodation

In the event of illness resulting in the need for an accommodation for an assignment or midterm, students should complete the self-declaration Illness Accommodation Request: https://web.wlu.ca/illness/. You do not need to email the instructor separately if this form is filled out. Note that when submitted, it's emailed to all your instructors for the term.

Accessible Learning:

Students with disabilities or special needs are advised to contact Laurier's Accessible Learning Centre for information regarding its services and resources.

Wellness Resources

- Waterloo Student Wellness Centre: 519-884-0710, x3146. The Centre supports the physical, emotional, and mental health needs of students. Located on the 2nd floor of the Student Services Building, booked and same-day appointments are available Mondays, Tuesdays, and Wednesdays from 8:30 am to 7:30 pm, and Thursdays and Fridays from 8:30 am to 4:15 pm. Contact the Centre at x3146, wellness@wlu.ca or @LaurierWellness. After hours crisis support available 24/7. Call 1-844-437-3247 (HERE247).

- Good2Talk is a postsecondary school helpline that provides free, professional and confidential counselling support for students in Ontario. Call 1-866-925-5454 or through 2-1-1. Available 24-7.

- Waterloo Foot Patrol: 519.886.FOOT (3668). Foot Patrol is a volunteer operated safe-walk program, available Fall and Winter daily from 6:30 pm to 3 am. Teams of two are assigned to escort students to and from campus by foot or by van.

- Waterloo Student Food Bank: All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.

Academic Resources:

- Academic Calendar: Review the Academic Calendar for information regarding all important dates, deadlines, and services available on campus.

- Mathematics and Statistics Learning Support (MaSt): MaSt offers diagnostic and review services to refresh your knowledge in fundamental math skills. Support

includes weekly homework sessions and drop-in help. All students are eligible to use this service. Office Location: P215, Peters Building (Waterloo).

- Writing services: Writing services have several resources to help you develop writing skills needed to succeed in the MABE program. They provide one-on-one writing appointments and writing workshops (both online and in person). The Writing and Learning Lab is in the Teaching and Learning Commons, 2nd floor Peters., room P226.

- PRISM: MABE students are PRISM members, and your OneCard should give access to the Finance lab (LH1015), and LH1014 (if not in use). The computers have Stata, R, and Bloomberg. They also offer regular training courses. Check out "Prism Resources" on your MyLearningSpace account.

Notice of data collection

The Lazaridis School of Business & Economics is accredited with AACSB. AACSB accreditation helps further Laurier's goal of inspiring lives of leadership and purpose by demonstrating our commitment to impactful learning, community engagement, and professional growth. In order to maintain this accreditation, aggregate information about student performance in this course may be collected, analyzed, and disclosed to AACSB as part of the Lazaridis School's Assurance of Learning (AoL) reporting requirements. Your name, ID number, and individual performance will not be shared outside the university as part of this process.

If you have any questions, please contact the AoL coordinator at aol@wlu.ca. To find out more about how your personal information is collected, used, and disclosed, please review Laurier's Notice of Collection, Use and Disclosure of Personal Information, or visit wlu.ca/privacy.

MABE Program: Learning Goals and Objectives

GOALS (things students should be or have)		OBJECTIVES (things students should do or make)	
1	Graduates will have a comprehensive understanding of Economic Theory and Policy.	1.1	Identify issues in current economic & business environment, in a broader global and social context.
		1.2	Apply appropriate microeconomic models to economic or business problems.
		1.3	Apply appropriate macroeconomic models to economic or business problems.
		1.4	Demonstrate understanding of empirical techniques in economics.
2	Graduates will have effective communication skills.	2.1	Write effectively in a range of different formats
		2.2	Conduct effective oral presentations
3	Graduates will have professional skills relevant for careers in economics.	3.1	Compile and analyze economic and business data using appropriate computer software
		3.2	Work independently according to professional standards, demonstrating initiative, responsibility, accountability and ethics
4	Graduates will be able to incorporate economic theory and empirical analysis in the evaluation of economic decisions.	4.1	Formulate and solve economic and business problems using appropriate microeconomic, macroeconomic and/or empirical techniques in economics
5	Graduate will be able to develop and complete an original research project.	5.1	Find, assess, and evaluate existing research at or near the frontier of economic knowledge
		5.2	Apply advanced theory and/or empirical analysis at the frontier of economic knowledge to examine specific economic/business questions
		5.3	Use knowledge, research, and communication skills to undertake original research, with understanding of its complexities and limitations

Goals & Objectives Approved by Economics Council: February 28, 2020