ADAN|ADEC7460.02 Predictive Analytics / Forecasting, 3 Credits
Woods College of Advancing Studies
Summer 2023 Semester, Jul 5-Aug 18

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Office Hours: Sat & Sun morning, text 210-837-9977 first
Meeting Room: https://bccte.zoom.us/my/doclarry2
Class Location: Online
Meeting Room: https://bccte.zoom.us/my/doclarry2
Class Meeting Time(s): Monday at 8 PM ET

Course Description
This course will expose students to the most popular forecasting techniques used in industry. We will cover time series data manipulation and feature creation, including working with transactional and hierarchical time series data as well as methods of evaluating forecasting models. We will cover basic univariate Smoothing and Decomposition methods of forecasting including Moving Averages, ARIMA, Holt-Winters, Unobserved Components Models, and various filtering methods (Hodrick-Prescott, Kalman Filter). Time allowing, we will also extend our models to multivariate modeling options such as Vector Autoregressive Models (VAR). We will also discuss forecasting with hierarchical data and the unique challenges that hierarchical reconciliation creates. The course will use the R programming language although no prior experience with R is needed.

Course Delivery: online

Textbooks (with ISBN) & Readings (Required)
All articles/handouts will be available in Canvas unless otherwise noted.

- Hyndman & Athanasopoulis. *Forecasting: principles and practice 3, https://otexts.com/fpp3/*
- R Software (freely available: http://www.r-project.org/)

Other equipment /material requirements
R Statistical Software (Free: https://cran.r-project.org/)

Textbooks & Readings (Recommended)
None

Canvas
Canvas is the Learning Management System (LMS) at Boston College, designed to help faculty and students share ideas, collaborate on assignments, discuss course readings and materials, submit assignments, and much more - all online. Your course will make significant use of Canvas this semester; you should familiarize yourself with this useful tool. For more information and training resources for using Canvas, see https://bcservices.bc.edu/service/canvas. In the case of any technical difficulties or concerns, please contact canvas@bc.edu or 617-552-HELP (4357) for immediate assistance. Canvas requires computer specifications and Wi-Fi access. It is important that you plan accordingly.

Course Outcomes
1. Students will demonstrate competency across cultural settings and will learn the impact of culture, gender, and age in ADEC 7310 as demonstrated by appropriate synchronous and asynchronous communication.
2. Students will demonstrate ethical competency pertaining to data analysis as demonstrated by assignment submissions and projects.
3. Students will gain intermediate level, practical knowledge of data analysis and econometrics, as demonstrated by assignments and projects.
4. Students will be able to effectively use a statistical/econometric software package, as demonstrated by use of R in assignments and projects.

Assessments and Grading Policy
In this course, there are four graded components.

7 discussions (Objectives 1 through 4)
3 homework assignments (Objectives 1 through 4)
1 midterm and presentation (Objectives 1 through 4)
1 final and presentation (Objectives 1 through 4)

Discussions (1% x 7 = 7%). Post your first response (written or video) to Discussion #1 early in the learning week, no later than WEDNESDAY at 11:59 pm EST; then respond to a minimum of two other posts (text only) from classmates by SUNDAY at 11:59 pm EST. No late posts are accepted. The rubric follows:

Criteria	Not completed	Below Graduate Level	Graduate Level
Initial post answers the requirement	0	.25	.5
Follow-up discussions contribute to learning	0	.25	.5
Total	0	.5	1

Homework Assignments (3 x 10% = 30%). Most weeks by SUNDAY at 11:59 pm EST, you will complete homework based on the week's learning. All assignments require the use of R software.

Midterm Assignment and Presentation (30%). During week 4, you will complete a take-home, applied data analysis midterm. The rubric for this midterm is on Canvas. The assignment is due SUNDAY at 11:59 pm EST at the end of week 4.

Final Assignment (33%). During week 7, you will compete in an applied data analysis final. The rubric for this final is on Canvas. The assignment is due SUNDAY at 11:59 pm EST at the end of week 7.

Deadlines and Late Work
Due to the compressed nature of this course, you may only submit late work up to 5 days after

the assignment due date. The penalty without a priori coordination is 20% / day. I do not accept late examinations or discussion posts.

Course Assignments
Most students should spend nine hours each week working to master the content in this course. The weeklyschedule and assignments follow.

Assessment Grading Breakdown Course Component	*Percentage*
Discussion Participation	7%
Assignments	30%
Midterm Assignment & Presentation	30%
Final Assignment & Presentation	33%

I do not provide extra credit for graduate students.

The graduate grading system for Woods College follows.

A (4.00), A- (3.67)
B+ (3.33), B (3.00)
B- (2.67)
C (2.00)
F (.00)

All students can access final grades through Agora after the grading deadline each semester. Students who complete course evaluations can access grades earlier.

Course Assignments
Most students will spend nine hours each week working to master the content in this course. The schedule and assignments follow.

Course Schedule
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Week	Topic	Readings	Assignments
1	Time series graphics, decomposition, features, and toolbox, time series regression	Hyndman Chapters 1-5 and 7	Week 1 Discussion 1: Introduce Yourself Week 1 Discussion 2: Stock Forecasting Start Homework 1 Start Midterm Review Final Presentation and Paper requirements
2	Exponential Smoothing	Hyndman, Chapter 8	Week 2 Discussion Submit Homework 1 Continue Midterm Assignment
3	ARIMA	Hyndman, Chapter 9	Week 3 Discussion Start Homework 2 Submit Midterm Start Final Presentation and Paper Assignment
4	Dynamic Regression	Hyndman, Chapter 10	Week 4 Discussion Submit Homework 2 Continue Final Presentation and Paper Assignment
5	Hierarchical and grouped forecasting	Hyndman, Chapter 11	Week 5 Discussion Continue Final Presentation and Paper Assignment
6	Advanced Forecasting methods	Hyndman, Chapter 12 & 13	Week 6 Discussion Submit Homework 3 Continue Final Presentation and Paper Assignment
7	Final Project	Review all readings from the course	Week 7 Discussion Submit Final Assignment: Paper and Presentation

Due Dates

Homework is due by Sunday, 11:59 PM ET, of weeks 2, 4, and 6 (HW1, HW2, HW3, respectively.) The midterm is due by Sunday, 11:59 PM ET, Week 3. The final is due by Sunday, 11:59 PM ET, Week 7. Initial discussion posts are due by Wednesday at 11:59 PM ET. Follow-up posts are due by Saturday at 11:59 PM ET. (This leaves Sunday for you to finish any assignment.

Participation/Attendance

Participating in class is a key part of learning. Students are expected to participate in and complete all discussions, assignments, and assessments. Grading rubrics apply for late discussion posts.

Consistent with BC's commitment to creating a learning environment that is respectful of persons of differing backgrounds, we believe that every reasonable effort should be made to allow members of the university community to observe their religious holidays without jeopardizing their academic

status.

Students are responsible for reviewing course syllabi as soon as possible, and for communicating with the instructor promptly regarding any conflicts with observed religious holidays. Students are responsible for completing all class requirements for days missed due to conflicts with religious holidays.

Accommodation and Accessibility

Boston College is committed to providing accommodations to students, faculty, staff, and visitors with disabilities. Specific documentation from the appropriate office is required for students seeking accommodation in Woods College courses. Advanced notice and formal registration with the appropriate office is required to facilitate this process. There are two separate offices at BC that coordinate services for students with disabilities:

- The Connors Family Learning Center (CFLC) coordinates services for students with LD and ADHD.
- The Disabilities Services Office (DSO) coordinates services for all other disabilities.

Find out more about BC's commitment to accessibility at www.bc.edu/sites/accessibility.

Scholarship and Academic Integrity

Students in Woods College courses must produce original work and cite references appropriately. Failure to cite references is plagiarism. Academic dishonesty includes, but is not necessarily limited to, plagiarism, fabrication, facilitating academic dishonesty, cheating on exams or assignments, or submitting the same material or similar material to meet the requirements of more than one course without seeking permission of all instructors concerned. Scholastic misconduct may also involve, but is not necessarily limited to, acts that violate the rights of other students, such as depriving another student of course materials or interfering with another student's work. Please see the Boston College policy on academic integrity for more information.

Health Integrity Policy

Particularly during this time of the COVID-19 pandemic, we must take even greater measures to care for ourselves, for each other and for our community. Therefore, we are asking that all Woods College students care for themselves by monitoring their health and washing their hands thoroughly before class. We ask that students demonstrate their care for others by wearing a mask/cloth face covering at all times when in the buildings on campus, maintain appropriate physical distancing and to not attend class if feeling unwell.