New Jersey Institute of Technology

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Spring 2024

MATH 447-002: Applied Time Series Analysis

A. Wang

Recommended Citation

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MATH 447: Applied Time Series Analysis
Spring 2024 Course Syllabus

NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: An introduction to applied univariate time series analysis. Topics include regression techniques for modeling trends, smoothing techniques (moving average smoothing, exponential smoothing), autocorrelation, partial auto-correlation, moving average, and autoregressive representation of series, Box-Jenkins models, forecasting, model selection, estimation, and diagnostic checking, Fourier analysis, and spectral theory for stationary processes. Effective From: Fall 2010.

Number of Credits: 3

Prerequisites: Math 341 with a grade of C or better or Math 333 with a grade of C or better.

Location and time: Faculty Memorial Hall 110 every Monday and Wednesday

Course-Section and Instructors:

Course-Section	Instructor
Math 447-002	Professor A. Wang

Office Hours for All Math Instructors: Spring 2023 Office Hours and Emails

Required Textbook:

Title	*Time Series Analysis: With Applications in R*
Author	Cryer and Chan
Edition	2nd
Publisher	Springer
ISBN #	978-0387759586

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 1, 2024**. It will be strictly enforced.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. DMS takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Homework and Quizzes	30%
Midterm Exam	30%
Final Exam	40%

Your final letter grade will be based on the following tentative curve.

A	90 - 100	C	68 - 74
B+	85 - 89	D	50 - 67
B	80 - 84	F	0 - 49
C+	75 - 79		

Attendance Policy: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the Math Department's Attendance Policy. This policy will be strictly enforced.

Homework: Homework problems will be assigned in class.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. Exams are held on the following days:

Midterm Exam	TBA
Final Exam Period	May 3 - May 9, 2024

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the Math Department's Examination Policy. This policy will be strictly enforced.

Makeup Exam Policy: There will be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam will be missed.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Faculty Memorial Hall 110

Further Assistance: For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department's webpage for Instructor Office Hours and Emails.

Accommodation of Disabilities: The Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Scott Janz, Associate Director of Disability Support Services at 973-596-5417 or via email at scott.p.janz@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and Services office authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Office of Accessibility Resources and Services (OARS) website at:

https://www.njit.edu/accessibility/

Important Dates (See: Spring 2024 Academic Calendar, Registrar)

Date	Day	Event
January 18, 2024	Tuesday	First Day of Classes
January 22, 2024	Monday	Last Day to Add/Drop Classes
March 10, 2024	Monday	Spring Recess Begins
March 16, 2024	Saturday	Spring Recess Ends
April 1, 2024	Monday	Last Day to Withdraw
April 30, 2024	Tuesday	Last Day of Classes
May 1 - May 2, 2024	Wednesday and Thursday	Reading Days
May 3 - May 9, 2024	Friday to Thursday	Final Exam Period

Course Outline

Date	Lecture	Chapter	Topic
WEEK 1 01/17	1	Chapter 1	Introduction and Chapter 2 Fundamental Concepts (I)
WEEK 2 01/22-01/24	2,3	Chapter 2	Chapter 2 Fundamental Concepts (I)
WEEK 3 01/29-01/31	4,5	Chapter 2	Chapter 2 Fundamental Concepts (II)
WEEK 4 02/05-02/07	6,7	Chapter 3	Trends (I)

WEEK 5 2/12-2/14	8,9	Chapter 3	Trends (II)
WEEK 6 02/19-02/21	10,11	Chapter 4	Models for Stationary Time Series (I)
WEEK 7 02/26- 02/28	12,13	Chapter 4	Models for Stationary Time Series (II)
WEEK 8 03/04 - 03/06	14,15	Chapter 5	Models for Nonstationary Time Series and Midterm Exam
WEEK 9 3/11 - 3/13	**SPRING BREAK NO CLASSES**		
WEEK 10 3/18 - 3/20	16,17	Chapter 6 Model Specification (I)	
WEEK 11 3/25 – 3/27	18,19	Chapter 6	Model Specification (II)
WEEK 12 04/01-04/03	20,22	Chapter 7	PARAMETER ESTIMATION
WEEK 13 04/08-04/10	22,23	Chapter 7	PARAMETER ESTIMATION
WEEK 14 04/15-04/17	24,25	Chapter 8	Model Diagostics
WEEK 15 04/22-04/24	26,27	Chapter 9	Forecasting
WEEK 16 04/29	**REVIEW FOR FINAL EXAM**		