AMS316 Introduction to Time Series

Meeting time: MW, 4:25pm-5:45pm

Classroom: Melville Library W4525

Instructor: Haipeng Xing (Haipeng.xing@stonybrook.edu)

        OH: Wednesday, 12:30-2:30pm, Math Tower 1-102

TA/Graders: Anton Malandii (anton.malandii@stonybrook.edu)

        Office hour: 2pm-5pm, Friday, Math Tower B-148.

Prerequisite: AMS311 (Probability theory) and AMS315 (Data analysis)

        For your information, AMS311 covers probability spaces, random variables, moment generating functions, algebra of expectations, conditional and marginal distributions, multivariate distributions, order statistics, law of large numbers; and AMS315 covers statistical analysis of data, exploratory data analysis, estimation, parametric and nonparametric hypothesis tests, power, robust techniques, use and interpretation of statistical computer packages, such as SPSS.

Course website: http://www.ams.sunysb.edu/~xing/AMS316/index.html

        Course notes, homework and solutions are posted in the website.

Grading policy: homework (15%), two midterms (40%), final (45%)

1. There is homework every 1.5 week, and it is due in the first 30 minutes of the lecture. Late homework is NOT accepted. Homework solutions will be posted on the course website.
2. Two midterms will be given during the lecture times of October 24 and November 21, respectively.
3. Exams will be held in person.

Main reference for the course:

1. Chris Chatfield & Haipeng Xing. The Analysis of Time Series: An Introduction (7th ed.). Chapman & Hall/CRC.
2. My course notes.

        This course will cover linear time series models, moving average (MA), autoregressive (AR), ARMA and ARIMA models, estimation and forecasting, interval predictions, and forecast errors.

Tentative syllabus:

The following is a tentative agenda for homework, midterms, projects and presentation (the schedule is subject to change).

Week 1	Introduction, review of probability and statistics
Week 2	review, Chap2
Week 3	Chap2 and R introduction I
Week 4	Sec 3.1-3.3 (probability concepts)
Week 5	Sec 3.4.1-3.4.3 (MA models)
Week 6	Sec 3.4.3-3.4.4 (MA and AR models)
Week 7	Midterm 1; Sec 3.4.4 (AR model)
Week 8	Sec 3.4.4, Sec 3.4.5 (ARMA model)
Week 9	Sec 3.4.6 (ARIMA model)
Week 10	Sec 4.1 (Estimation of ACF), R introduction II
Week 11	Sec 4.2 (Estimation of AR)
Week 12	Midterm 2
Week 13	Sec 4.3 (Estimation of MA)
Week 14	Sec 4.4 (Box-Jenkins method), R introduction II
Week 15	Chap 5 (forecasting); review

Course Delivery Mode and Structure:

This is an asynchronous online course delivered in the Blackboard learning management system (LMS). Students must be mindful of all course expectations, deliverables and due dates, especially because the online portion of the course requires significant time management. All assignments and course interactions will utilize internet technologies. See "Technical Requirements" section for more information. In Blackboard, you will access course videos, lecture notes, and codes. There will be ongoing coding assignments to be submitted regularly through blackboard. Please see the posting under Announcements regarding the process for submitting coding assignments via blackboard.

How We Will Communicate:

Course-related questions should be posted in the General Questions Forum in the course Discussion board. For personal/private issues, email me directly. If you have a statistical laboratory question, (for example questions on HW), it is best that you plan on visiting one of the office hours listed under Office Hours by Day under Announcements. If you use Blackboard's email tool from the course site, it will automatically include your full name, course name and section when you send me an email. Please allow between 24-48 hours for an email reply. Your Stony Brook University email must be used for all University-related communications. You must have an active Stony Brook University email account and access to the Internet. All instructor correspondence will be sent to your SBU email account. Plan on checking your SBU email account regularly for course-related messages.

Technical Requirements:

This course uses Blackboard for communication between faculty and students, submission of assignments, and posting of grades. The Blackboard course site can be accessed at https://blackboard.stonybrook.edu. We do not recommend completing the coursework on a smart- phone or tablet, this could be problematic. The following list details a minimum recommended computer set-up and the software packages you will need :
- PC with Windows 8 or higher (we recommend a 3-year Warranty)
- Macintosh with OS 10.11 or higher (we recommend a 3-year Warranty)
- Intel Core i5 or higher
- 250 GB Hard Drive
- 8 GB RAM
- Latest version of Chrome, Firefox or Explorer; Mac users may use Chrome, Firefox or Safari. (A complete list of supported browsers and operating systems can be found on the My Institution page when you log in to Blackboard.)
- High speed internet connection
- Printer
- Word processing software (Microsoft Word, Pages, etc.)
- Speakers (either internal or external) or headphones
- Ability to download and install free software applications and plug-ins (note: you must have administrator access to install applications and plug-ins).
- Adobe Flash player with the latest update is crucial for playing multiple videos throughout the course

Technical Assistance:

If you need technical assistance at any time during the course or to report a problem with Black- board you can:
- Phone: 631-632-9800 (client support, Wi-Fi, software and hardware)

• Submit a help request ticket: https://it.stonybrook.edu/services/itsm
• If you are on campus, visit the Walk-Up Tech Support Station in the Educational Communications Center (ECC) building.

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at https://www.stonybrook.edu/commcms/academic_integrity/index.html

Student Accessibility Support Center (SASC) Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632- 6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: https://ehs.stonybrook.edu/programs/fire- safety/emergency-evacuation/evacuation-guide-people-physical-disabilities and search Fire Safety and Evacuation and Disabilities.

Critical Incident Management Statement

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Assessment of Student Performance

• Homework assignments, examinations, and term papers should be evaluated and returned promptly. Written comments, explaining the instructor's criteria for evaluation and giving suggestions for improvement, should be provided.

• Instructors are responsible for providing students with appropriate and timely notification about their academic performance in a course. An examination or other assessment measure should be administered, graded, and returned to students before the end of the ninth week of classes.

• Examinations and term papers submitted at the end of the term should be graded and either returned to students or retained for one semester.

• Any change to the course grading policy during the semester must be announced and made available to all students enrolled in the course. Assigning additional work to individual students who wish to improve their grades, during or after the semester, is prohibited.

• Instructors must observe the Final Examination Schedule available at https://www.stonybrook.edu/registrar . Instructors of courses taught on the semester schedule may only give a unit exam in class during the last week of the semester if a final examination is also given during the Final Examination Period.

• Instructors must observe state laws, federal laws, and University policies regarding accommodations as noted in the Bulletin (e.g., student participation in University-sponsored activities or equivalent opportunity/religious absences). Accommodations such as make-up exams, assignments, or other coursework that fall outside of the purview of these laws and policies are at the discretion of the instructor.

Professional Conduct and Interaction with Students

• Instructors must report all suspected occurrences of academic dishonesty to the Academic Judiciary Committee (for classes in the College of Arts and Sciences, College of Business, School of Marine and Atmospheric Sciences, and School of Journalism) or the Committee on Academic Standing and Appeals (for classes in the College of Engineering and Applied Sciences).

• Instructors should always be aware that in teaching and advising they represent the University. They are bound by the University's sexual harassment policies. Instructors are also bound by University policies that prohibit any consensual relationships with students that might compromise the objectivity and integrity of the teacher-student relationship. Examples include romantic, sexual, or financial relationships.

• Instructors should strive to maintain the privacy and confidentiality of students' examinations, homework, and final grades.

• In dealing with students, instructors should be polite, helpful, and fair. They should take into account the wide range of cultural factors and physical challenges that can affect learning, and should attempt to help students overcome any disadvantages.