

Applied Time Series Analysis, 22S:156, Spring, 2007

January 17, 2007

Instructor: Jun Yan

jyan@stat.uiowa.edu (*NOT* jun-yan@uiowa.edu, which belongs to someone else)

<http://www.stat.uiowa.edu/~jyan/teaching/s156/>

219 SH

319/335-0824

Department: Statistics and Actuarial Science

<http://www.stat.uiowa.edu/>

241 SH

M–F 8:30a–12:00p, 1:00p–4:30p

DEO Contact: Luke Tierney

luke-tierney@uiowa.edu

241 SH

319/335-0712

Lectures:

MWF 8:30a–9:20a, 14 SH

Office Hours: MW 11:30a–12:20p, Th 4:40–5:30 (or by appointments)

ICON: <http://icon.uiowa.edu/>

- Log in using your Hawk ID and Hawk ID password.
- Please do *NOT* submit homework through WebCT.

Course Description: This course covers the analysis and modeling of time series data with emphasis on the time-domain approach. Autocorrelation functions, stationarity, and autoregressive integrated moving average models for nonseasonal and seasonal time series are discussed. Additional topics are intervention analysis, heteroskedasticity models, multivariate models, and nonlinear models. Illustration is provided on how to construct such models from data, and students discuss the specification on these models, the estimation of their parameters, diagnostic checks to assess their validity, and the predictions that are implied by these models. Statistical computer packages are used throughout.

Requirements include two midterms, a term project, and several homework and computer assignments.

The objective of the course is to introduce some statistical methods useful for analyzing univariate time series obtained from scientific studies with emphasis on forecasting and statistical inference. Statistical softwares such as R/Splus and SAS will be used.

Prerequisites 22S:131, and 22S:152 or 22S:164

Textbook: Cryer and Chan (2007) *Time Series Analysis*, 2nd Edition Manuscript.

The first 12 chapters will be covered. The last two chapters or other advanced topics will be covered if time permitting.

Grading: Assessment of the subject will be based on the following four components with weights shown in parenthesis:

Style (5%) I expect almost everyone to receive all five points. If my grader or I had to reread a solution several times to find a train of thought, or if a solution was illegible, ambiguous, or incoherent, it would affect Style Points.

Homework (15%) Unless stated otherwise, homework will be collected on each Friday at the beginning of the class. Please do not merely write down answers, but clearly show how you got your results.

Each homework carries equal weight and the one with lowest mark will be dropped from the determination of the final grade.

Late homework will not be accepted. You are encouraged to discuss homework problems, but you must write up the solutions independently. No credit will be given to assignments that are substantially similar.

Midterm exams (60%) There will be two 90-minute midterm exams, 30% each. They will be in week 6 (02/19) and week 11 (04/02). Both are Monday evening exams.

Missed exams may be made up only with documentation of reasons required by the university policy, i.e. because of “illness, mandatory religious obligations, or other unavoidable circumstances or University activities.”

Project (20%) Each student is required to work either alone or with one other student on a project applying time series analysis to problems of their own choice.

- Project proposal is due on Friday, 03/02. This is a detailed description of what you plan to do, including question(s) to be addressed and models to be used.

- Project interim report is due on Friday, 04/13. This informal report will indicate that your project is “on track”. The report includes results obtained thus far and a brief summary of what they mean and what remains to be done. In addition, if your project is a collaborative project, each member of the project team will list which tasks they have performed for the group.
- Project presentation will be done in the last two weeks. The final form of the project is a paper in pdf format of 15 pages or less (double spaced, 11pt, with graphics and tables included). Attendance in the last two weeks is required. Each student will give a score for other projects and the score will be incorporated into my grading.

FreeBSD and Linux), Windows and MacOS. R is available at the ITC in Schaeffer Hall.

University Policies:

- Course policies are governed by the College of Liberal Arts and Sciences.
- University policies regarding Student Rights and Responsibilities can be found at http://www.clas.uiowa.edu/students/academic_handbook/.
- I would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please see me about this as soon as possible.

Additional Information:

- A list of independent tutors can be found at <http://www.stat.uiowa.edu/courses/tutors.html>.

Important Dates: Please mark your calendar.

Date	Event
02/19, 6–7:30pm	Midterm 1
03/02, before class	Project proposal due
04/02, 6–7:30pm	Midterm 2
04/13, before class	Project interim report due
05/04, before class	Project report due

Tentative Course Schedule: This tentative schedule is subject to change as the semester goes.

Week	Topics
01/15	Introduction
01/22	Fundamental concepts; Trends
01/29	Stationary time series
02/05	Nonstationary time series
02/12	Model specification
02/19	Parameter estimation
02/26	Model diagnostics
03/05	Forecasting
03/12	<i>Spring break</i>
03/19	Seasonal models
03/26	Time series regression
04/02	Heteroskedasticity models
04/09	TBA
04/16	TBA
04/23	Project presentations
04/30	Project presentations

Computing: We will mainly use R (GNU Splus) for statistical analysis. R is a language and environment for statistical computing and graphics (<http://www.r-project.org>). R is available as Free Software under the terms of the Free Software Foundation’s GNU General Public License in source code form. It compiles and runs on a wide variety of UNIX platforms and similar systems (including