George Mason University
Graduate Course Approval/Inventory Form

Please complete this form and attach a copy of the syllabus for new courses. Forward it as an email attachment to the Secretary of the Graduate Council. A printed copy of the form with signatures should be brought to the Graduate Council Meeting. Complete the Coordinator Form on page 2, if changes in this course will affect other units.

Please indicate:  

___X___ NEW  ___ MODIFY  ___ DELETE

Local Unit:  APPLIED AND ENGINEERING STATISTICS  
Graduate Council Approval Date:

Course Abbreviation:  STAT  
Course Number:  758

Full Course Title:  Advanced Time Series Analysis (3:3:0)

Abbreviated Course Title (24 characters max.):  Adv Time Series Analysis

Credit hours:  3  
Program of Record:  MS in Statistical Science

Repeatable for Credit?  

___D=Yes, not within same term  Up to hours  
___T=Yes, within the same term  Up to hours  
:X=N=Cannot be repeated for credit

Activity Code (please indicate):  

___ Lecture (LEC)  ___ Lab (LAB)  ___ Recitation (RCT)  
___ Studio (STU)  ___ Internship (INT)  ___ Independent Study (IND)  ___ Seminar (SEM)

Catalog Credit Format  3:3:0  
Course Level:  GF(500-600)  ___ GA(700+)  X

Maximum Enrollment:  35  
For NEW courses, first term to be offered:  SPRING 05

Prerequisites or corequisites:  STAT 658 and STAT 652

Catalog Description (35 words or less)  Please use catalog format and attach a copy of the syllabus for new courses.:  STAT 758 Advanced Time Series Analysis (3:3:0). Theory and application of advanced time series analysis techniques. Topics include parametric and nonparametric spectral analysis, lagged regression models, signal extraction and filtering, state-space and multivariate ARMAX models, bootstrapping and Markov chain Monte-Carlo methods, discrimination and cluster analysis, principal components and factor analysis. as

For MODIFIED or DELETED courses as appropriate:

Last term offered:  
Previous Course Abbreviation:  
Previous number:  

Description of modification:

APPROVAL SIGNATURES:
Submitted by:  A. Richard Bolstein  
email: rbolstein@gmu.edu

Department/Program:  
Date: 1/21/04

College Committee:  
Date: 5/24/04

Graduate Council Representative:  
Date: 8/5/04
**GEORGE MASON UNIVERSITY**  
*Course Coordination Form*

**Approval from other units:**

Please list those units outside of your own who may be affected by this new, modified, or deleted course. Each of these units must approve this change prior to its being submitted to the Graduate Council for approval.

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**Graduate Council approval:**  ______________________________________________  Date: ____________

**Graduate Council representative:** __________________________________________  Date: ____________

**Provost Office representative:** _________________ _______________________  Date: ____________
1. Catalog Description
   A. STAT 758 Advanced Time Series Analysis (3:3:0)
   B. Prerequisites: STAT 658 and STAT 652.
   C. Catalog Description: Theory and application of advanced time series analysis techniques. Topics include parametric and nonparametric spectral analysis, lagged regression models, signal extraction and filtering, statespace and multivariate ARMAX models, bootstrapping and Markov chain MonteCarlo methods, discrimination and cluster analysis, principal components and factor analysis.

2. Justification
   A. Course Objectives: Time series analysis is used for diverse applications in economics, the social sciences, the physical and environmental sciences, medicine, and signal processing. This course follows STAT 658 and will continue to develop the fundamental principles and some advanced topics in Time Series Analysis, as well as algorithms for implementing the concepts. Applications are mainly in economics and the social and physical sciences.
   B. Desirability of adding this course: STAT 658 provides an introduction to Time Series Analysis and covers about half of the material in the Shumway and Stoffer text. STAT 758 will cover the remaining material and provide students in Statistics and Computational Sciences with a more complete foundation in Time Series Analysis. Students completing STAT 658 and 758 should be prepared to take Ph.D. level classes in this field.
   C. Relationship to other graduate courses: This course is a followon to STAT 658 Time Series Analysis and Forecasting. It covers advanced models and techniques of time series analysis with applications mainly in economics and the social and physical sciences. It requires statistical inference concepts covered in STAT 652.

3. Course Requirements
   B. Requirements: Students will complete weekly homework assignments and projects involving analysis of time series data. There will several midterm quizzes and a final exam and/or project.

4. Scheduling
   A. Time of initial offering: Spring 2005. Thereafter, the course will be offered alternate spring semesters immediately following STAT 658.
   B. Proposed Instructors: Dr. Kristine Bell (and/or other STAT professors).

5. Approval History
   This course has been approved by the following:
   A. AES Department on 1/21/04
   B. IT&E Graduate Committee on
   C. IT&E Dean on
Description: Time series analysis is used for diverse applications in economics, the social sciences, the physical and environmental sciences, medicine, and signal processing. This course follows STAT 658 and will continue to develop the fundamental principles and some advanced topics in Time Series Analysis, as well as algorithms for implementing the concepts. Applications are mainly in economics and the social and physical sciences. An integral part of the course is the use of MATLAB for simulation, calculation, and implementation of time series analysis techniques.

Prerequisite: STAT 658 and STAT 652. STAT 652 may be taken as a co-requisite.


Topics Covered: We will spend 1-2 lectures on each of the following topics:
- ARIMA models
- Lagged regression models
- Parametric and nonparametric spectral analysis
- Signal extraction and filtering
- State-space and multivariate ARMAX models
- Kalman filter
- Bootstrapping and Markov chain Monte-Carlo methods
- Discrimination and cluster analysis
- Principal components and factor analysis.

Grading: Grades are based on points earned from four components: Quizzes, Exam 1, Exam 2, and Projects. Quizzes and Exams are open book and notes.

**Quizzes:** There will a short quiz every class except on exam days.
**Exam 1:** In class, mid-semester.
**Exam 2:** Combination in-class/take-home, end of semester.

**Projects:** There will be 5-6 take-home projects consisting of a combination of written problems and MATLAB exercises.