COURSE DESCRIPTION AND INSTRUCTIONS

This course will help you to understand the intuitive principles, theoretical foundations and practical application of some of the major statistical techniques used by economists. You should emerge from this course with a workable knowledge of econometrics, which will enable you to do empirical work and to evaluate the empirical work of others. You will learn to use the statistical software package Stata, one of the most used econometrics programs.

OFFICE

Office Hours:  Monday:  4-5:30  
Wednesday:  2:30-4:00  
and by appointment

Office: 112 Hubbard Hall, phone: 725-3593  
e-mail: jfitzger@bowdoin.edu

REQUIRED TEXTS


SUPPLEMENTARY TEXTS (on reserve) If you want alternative explanations.

The recommended supplement is A Guide to Econometrics by Peter Kennedy (MIT Press, 6th ed.). Kennedy is a very good, intuitive text. It tries to explain the forest as you walk through the trees. I highly recommend you own it, but you should at least read it. In the past students have said that they depended on it. A copy is on reserve.

Introductory Econometrics, Goldberger. (on reserve) a very clear, conceptual text.

Elements of Econometrics, J. Kmenta, McMillan, 2nd ed. (technical, uses matrix algebra)

All other readings will be on reserve or handed out.

COURSE REQUIREMENTS

There are several requirements for this course. The final course grade will depend on a weighted average of your performance on these requirements.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>3 Hourly Exams (18-1/3 % each)</td>
<td>55.0%</td>
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<tr>
<td>Empirical Research Paper</td>
<td>25.0%</td>
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<tr>
<td>Problem Sets, Quizzes, Review Paper</td>
<td>20.0%</td>
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The last requirement involves class participation. Class participation will be crucial in determining final grades that fall on the borderline between two grades. Participation means asking and answering questions.

The course exams will be administered at 7:30 PM on Thursday, Sept 30, Thursday November 2, and Thursday, December 2. Check these dates now. Please see me to discuss unavoidable conflicts. You are responsible for insuring that you have no conflicts at those times. We will have two extra classes on Wed. Sept 15 and Wed Sept 22 at 7:30pm, unless I can find a better mutually agreeable time. We will have NO class on Sept 23, Dec 7 and Dec 9.

Attendance at final class period Dec 19 at 9am to complete the course evaluation is required unless you hand in your paper early and complete the course evaluation at that time.
SHORT REVIEW PAPER

Learning to read econometric studies requires practice. I will present examples during the semester using the six points listed under the **Empirical Research Paper** section below to organize the discussion.

During the semester you will be required to summarize an article in this format. You may want to choose an article related to your research paper. The summary will be due on **November 9**.

PROBLEM SETS / QUIZZES

Most weeks will begin with a very short quiz (not open book) on material from the prior week. In addition, several problem sets will be handed out. You may work in pairs and hand in one copy. Late problem sets are penalized 5 percent each day for up to 3 days, with a weekend counting as 1 day; after that they are not accepted. You are not allowed to use old problem sets from other students or old answer keys. I consider this to be cheating. I recommend that you try the problem sets yourself before collaborating, so that you understand them well. One learns by doing, not by watching.

EMPIRICAL RESEARCH PAPER

The research paper for this course should be an econometric study. This project should be the most important part of this course for each of you. It will also be the most interesting, aggravating and time consuming part of the course. Depending on class size, each student will present a summary of his or her findings to the class.

This paper is assigned to provide experience in the full process of research in economics. An important part of such research is familiarity with available data. A website listing some major data sources will be made available. For special data sources consult the instructor or the Library staff. In selecting a topic for the term paper students may wish to develop their own models or to apply new or extended or revised data to re-estimate equations in an already published econometric study. You should also consult the various economic journals for studies of interest to you. A list of some important journals regularly containing empirical research in economics, and list of articles, will be made available later. The primary index for economics articles is Econlit which is available through the library web page.

The term paper should include the following:

1. A statement of the question to be answered, including the relevance of this work in the light of previous studies (literature review). Why would a reader be interested?

2. Mathematical formulation of the model, specification of a statistical model, and explanation of testable hypotheses. What do you intend to do?

3. Examination of the availability and adequacy of data used to estimate the model;

4. **Results.** Presentation of results and hypothesis tests.

5. Discussion of the methods used in estimating the model, and why they are appropriate. Consideration of any estimation (econometric) problems that arise in the process (testing for problems) and how they might be overcome, discussion of alternate specifications;

6. **Conclusions** relating the empirical results to the theory or model under consideration. How might the project be improved?

Note that formulation of the model includes discussion of the underlying theoretical structure, selection of the variables that belong in the equation, and specification of the appropriate relationships between the relevant variables. Careful attention at the specification stage is usually amply rewarded in terms of the time saved at later stages, suggesting
that one **should** begin with a strong theoretical foundation.

The research paper assignment formally consists of three parts. The first part, a preliminary report of not more than 2-3 pages, is due by October 26. It should indicate the topic you will investigate, an initial formulation of the model you will use, and an account of the data sources available. Choose a topic that interests you. Originality counts. Do not choose a topic that will be extremely time consuming in its data requirements. The second part is a 2-3 pages progress report due November 16. This must show that your data is entered into the computer and that you have a preliminary specification. You must show computer results (means, etc.). I will offer comments at this stage. The third stage is the paper itself and **is due during our scheduled final, December 19.** Give yourself plenty of time to go through drafts of the paper. Another student in the class will be assigned to offer comments to help improve your draft. (Comments will be graded.) Clarity of presentation will be taken into account in assigning grades. You will be penalized if you miss the due dates. Extensions: Your final paper will be penalized by 5 percent per day for each day late. The paper cannot be accepted (ie. becomes an F) after the end of the last final during finals week unless you have previously arranged for an incomplete with the Dean’s office. This is a college rule.

Reserves that you might find helpful in doing your project include:

Wooldridge Ch. 19  
Kennedy Ch. 21, Applied Econometrics  
Gopen and Swan, "The Science of Scientific Writing."
COURSE MATERIAL AND READINGS

I. REGRESSION OVERVIEW, STATISTICS REVIEW, AND ESTIMATION THEORY

A. Regression Review:
Wooldridge (W) Ch. 1

B. Statistics and Estimation Theory:
W Appendix B, C

Supplementary Reading:
Goldberger (G) ch. 1-5
Kennedy, Chs. 1,2.

Reviews of statistics and estimation may also be found in:
Mirer, *Economic Statistics and Econometrics* Ch 3,4,8,9

II. THE CLASSICAL LINEAR REGRESSION MODEL AND ITS ESTIMATION

A. Simple Regression Model:
W Ch. 2.1, 2.2, 2.3 plus appendix 2A

B. Properties of the OLS estimator
W Ch. 2.5

Supplement: Kennedy, Ch. 3, 4.
G 6,7,8
Kmenta, 7.1 to 7.3, 7.4.

III. MULTIPLE REGRESSION

A. Interpretation and Estimation
W Ch. 3

B. Inference
W Ch 4 Inference
W Ch. 5 Asymptotics

Supplement:
G Ch. 9,10
Kmenta, 10.1-10.2 (skip 422-425, scan 425-430) 10.3
C. Functional Form, Specification and Testing Restrictions
   W Ch 2.4
   W Ch. 6.1-6.3
   W. Ch. 7

   Supplement: Kennedy, Ch. 5, 6, 14.1-14.4.
   Kmenta, 11.1, 10.4, 11.3 TO P. 512.
   Studemund and Cassidy, Ch. 11, "A Regression User's Guide" (reserve).

IV. RELAXING THE CRM AND APPROPRIATE ESTIMATION TECHNIQUES

A. Specification problems
   W. 9.1,9.2

B. Stochastic Regressors and Errors in Variables
   W. Ch. 9.4, 9.5

   Supplement: Kennedy, Ch. 8.1-8.2.; G Ch. 13
   Kmenta, 8.4.

C. Panel Data (Cross-section time-series)
   W Ch 13,14.1,14.2

   Kmenta, Section 12-2.
   Kennedy, 17.1,17.2.

D. Heteroscedasticity
   W 8.1-8.4

   Supplement: Kennedy, Ch. 8.3 ; G Ch. 14
   Kmenta, 8.1, 8.2.

E. Autocorrelation and Time Series
   W 10.1-10.3; W12.1-12.5

   Supplement: Kennedy, Ch. 8.4, 18.1,18.2; G Ch. 15, 16
   Kmenta, 8.3.

V. SIMULTANEOUS EQUATION ESTIMATION AND ENDOGENEITY

   W. Ch. 15.1-15.7;
   W Ch 16.1-16.5

   Supplementary: Kennedy, Ch. 10.; G Ch. 18,19,20
   Kmenta, 13.
VI. **TOPICS (NOT ALL COVERED)**

A. **BINARY DEPENDENT VARIABLES:**
   W. Ch. 17.1
   Supplement: Kmenta, 11.5, pp. 547-557.; G Ch. 17
   Kennedy, Ch. 15.1.

B. **SAMPLE SELECTION AND TOBITS**
   W 17.2, 17.4, 17.5
   Kennedy, Ch. 16.1, 16.3.
   Kmenta, 11.6.

C. **DISCRETE CHOICE MODELS**
   Maddala Ch. 3, Kennedy 15.2

D. **THE BAYESIAN APPROACH**
   Kennedy Ch 13

E. **ROBUST REGRESSION**
   Kennedy, Ch. 20.

F. **MAXIMUM LIKELIHOOD METHODS**
   Kmenta, pp. 512-517.