Quantitative Analysis of the Macroeconomy
ECON 4741H: Spring 2011
Department of Economics - University of Minnesota
SYLLABUS

Instructor:	Amanda M Michaud
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Office Hours:	Hanson Hall 3-161, Tu: 12:30-2:30

Lecture:	Blegen Hall 140, Tuesday/Thursday: 11:15am-12:30pm
Course website:	`http://www.econ.umn.edu/~micha292/econ4741.html`

Course Description: This is an introductory course to modern methods of quantitative macroeconomics. The objective is to understand how models can be calibrated or estimated to answer quantitative questions related to the macroeconomy. The course requires students to carry out quantitative analyses to address specific questions. Students who successfully complete the course will acquire tools to answer questions of measurement, ie: effects of fiscal policy; as well as questions of accounting, ie: which factors cause some countries to grow faster than others? To achieve this, students will become familiar with theoretical methods and models of analysis. Computational methods to solve models without closed-form solutions will be introduced to enable the student to apply quantitative methods to a variety of environments. From there, students will learn how to construct meaningful mappings between models and data. Students will be encouraged to think critically about interpretation; how informative our results are is limited by both the data available and the models we use.

Prequisites: Course Prequisites are Econ 3101, 3201, and Stat 3011 (or equivalent). Students will be expected to have working knowledge of consumer/firm optimization. Therefore, students are expected to be comfortable with the calculus of general optimization. Prior knowledge of matrix algebra will be useful.

Course Resources: The primary resources for this course will include lectures notes and reading assigned from other sources. Students will be expected to consult multiple resources as directed and needed.

‡The ABCs of RBCs (McCandless and George (2008)): The textbook most closely related to this course.

‡Dynamic Economics: Quantitative Methods and Applications (Adda and Cooper (2003)) A more basic introductory text. Students will find this to be a very useful resource.

†Dynamic General Equilibrium Modeling Computational Methods and Applications (Heer and Maußner (2009)): An advanced text on dynamic general equilibrium. Introductory chapters may prove useful.

†‡**Numerical Methods in Economics** (Judd (1998)): Repository of computational methods useful for economists.

†‡**Applied Computational Economics and Finance** (Miranda and Fackler (2004)): Chapters 2 & 3 will be used in the course. Includes downloadable "CompEcon" toolkit for MATLAB.

Texts with (†) are available electronically through the University's library website. Texts with (‡) include MATLAB codes in the text or on the text's website.

Computer Languages

This is an *applied* theory course. All students will be required to do some programming to complete the course. We will use three basic types of programming languages. I will assume you have no experience with these languages. An introduction to Mathematica and Matlab will be provided.

Data Analysis : At the very least, you will be working with Microsoft Excel to organize data. Use of specialized statistical software (R, STATA, SPSS, SAS, Eview and JMP, among others) is encouraged. Knowledge of statistical programming is in high demand in occupations that employ individuals with Economics Bachelor's degrees. These software will not be covered in this course, but now is a great time to learn on your own or by taking another course!

Symbolic Algebra : Used to perform algebraic computations such as symbolic derivatives. Capable of creating plots and graphics. Easy to use with many predefined functions as part of the language. Too slow to use for anything beyond simple calculations. Instruction in Mathematica will be given. Other examples are Maple and Symbolic Toolkit for Matlab.

General Programming Languages : For complicated computations we will require a more serious programming language. Instruction will be given in Matlab. This program has several built-in functions, graphics capabilities, and is widely used by Economists. Octave is the freeware version. Alternate languages include Gauss, C++, and FORTRAN. Students wishing to program in either C++ or FORTRAN may do so as long as they produce free-standing executable files.

Course Requirements:

Syllabus: Students are required to read the syllabus and are responsible for adhering to the policies enclosed.

Class Attendance & Participation: Class attendance is crucial for students' success in this course. This is an applied course and students will be learning a series of tools that build upon each other. Occasionally class time will be set aside to serve as "workshops" for individual and group projects. Students not available to contribute to group projects during these times will have points deducted from their individual grade for that project. The instructor welcomes and encourages questions and discussion relevant to class topics.

Readings: Several readings will be assigned during the course. These will include instructional text on theory and techniques as well as economic papers illustrating quantitative methods and

applications in macroeconomics. Short reading reports will be assigned to validate participation.

Problem Sets: Several problem sets will be assigned during the course. Assignments will be posted on the course website and announced in class. Students are responsible for checking the course website frequently to download assignments. All problem sets must be typed and stapled with the student's name clearly written. Graphs and algebra may be neatly handwritten. Final grades of assignments not meeting these standards will be discounted by 25%. Students unable to submit assignments during class time must submit them ***prior*** to the due date at Hanson hall 4-101. No late assignments will be accepted. In acknowledgement of the prevalence of illness and miscellaneous personal disasters, each student's lowest **two** problem set / reading report grades will be automatically dropped.

Group Projects: There will be three group projects throughout this course. They will require you to fetch and analyze data as well as perform computations. Relevant computer codes and files for these projects must be e-mailed to the instructor. Submissions should be made in a single compressed (zip) file named as follows: Pxnames.zip. Where "names" identifies the group members and "x" is the project number. Only one submission per group. Each students' grade will be comprised of 75% a single group grade given by the instructor and 25% an individual score given by other group members. A computer code that does not run will be graded lower than inaccurate but running computer code. Well documented codes will receive higher grades

Exams: One midterm and a final will be given in class on the dates listed in the calendar. There is no make-up midterm. If a student, for whatever reason, is unable to take the midterm at the scheduled time, they must notify the instructor *before* the exam and I will base the student's final grade on the other course components. All exams are closed book, closed note, no calculators, and to be done individually.

The final exam is Tuesday, May 12, 1:30pm-3:30pm.
It is your responsibility to let your instructor know during the first two weeks if you have a conflict with this time.

Calculation of Course Grades: Students' numerical course grades will be computed as follows:

Component	Weighting
Problem Sets/Reading Reports	30%
Group Projects	20%
Midterm	20%
Final	30%
Total	100

Students can earn up to 100 points from Problem Sets, Reading Reports, Projects, and exam. Extra credit opportunities may arise at the instructor's discretion. Numerical totals will be converted to a letter grade by the following:

93-100	A
90-92	A-
88-89	B+
82-87	B
80-81	B-
78-79	C+
72-77	C
70-71	C-
68-69	D+
60-67	D
59 and below	F

Grading Disputes: Challenges to a grade may be presented ***in writing*** explaining why you believe you deserve a different grade. I reserve the right to regrade the entire assignment/exam, in which case your grade may be raised or lowered. All disputes must be submitted within 7 days of the return of the assignment.

Disabilities: It is the student's responsibility to register with Disability Services and notify the instructor as soon as possible if special accommodations are needed. The Department of Economics, in conjunction with Disability Services, will provide appropriate accommodations for students with disabilities.

Additional Remarks: Academic Dishonesty in the form of cheating or otherwise, will not be tolerated and may result in severe academic sanctions.

Very Tentative Course Outline:

Jan 18: Introduction: Quantitative Macroeconomics .....
Jan 20: Economic Measurement: Statistics .....
Jan 25: Economic Measurement: Macro Measurement. .....
Jan 27: Economic Measurement: Macro Measurement. .....
Feb 1: Economic Measurement: Micro Measurement. .... Group Pres
Feb 3: Introduction to Dynamic Programming .....
Feb 8: Introduction to Dynamic Programming .....
Feb 10: Basic Numerical Methods .....
Feb 15: Basic Numerical Methods .....
Feb 17: Basic Numerical Methods .....
Feb 22: Basic Numerical Methods .....
Feb 24: DP: Neoclassical Growth Model .....
Mar 1: DP: Social Planners Problem and Equivalance .....
Mar 3: Log Linearization: Steady State & Impulse Response .....
Mar 8: Midterm .....
Mar 10: Log Linearization: Steady State & Impulse Response .....
Mar 15 & 17: Spring Break ..... No Lecture
Mar 22: Log-linearization: Computation .....
Mar 24: Log-linearization: Computation .....
Mar 29: Log-linearization: ..... Group Pres
Mar 31: Dynamic Programming: Welfare .....
Apr 5: Applications: Endogenous Labor Supply .....
Apr 7: Applications: Endogenous Labor Supply .....
Apr 12: Applications: Taxes .....
Apr 14: Applications: Taxes .....
Apr 19: Applications: Stochastic Technology Shocks .....
Apr 21: Applications: Stochastic Technology Shocks .....
Apr 26: Applications: Project Workshop .....
Apr 28: Applications: ..... Group Pres
May 3: Applications: ..... Group Pres
May 5: Presentations/Catch-up/Review .....
May 12: Final Exam 1:30-3:30pm ..... Location TBA

References

Adda, J. and R. W. Cooper (2003): *Dynamic Economics: Quantitative Methods and Applications*, vol. 1 of *MIT Press Books*, The MIT Press.

Heer, B. and A. Maussner (2009): *Dynamic General Equilibrium Modeling: Computational Methods and Applications*, Springer, 2nd ed. 2009. 2nd printing ed.

Judd, K. L. (1998): *Numerical Methods in Economics*, vol. 1, The MIT Press, 1 ed.

McCandless and George (2008): *The ABCs of RBCs*, Cambridge: Harvard University Press.

Miranda, M. J. and P. L. Fackler (2004): *Applied Computational Economics and Finance*, vol. 1, The MIT Press, 1 ed.