Computational Methods in Macroeconomics
E390: Spring 2016
Department of Economics - Indiana University
SYLLABUS

Instructor:	Amanda M Michaud
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Office Hour:	After class and by appointment
Lecture:	Wylie Hall 125, Tuesday/Thursday: 9:30-10:45am
Course website:	https://iu.instructure.com

Course Description: Modern economic analysis is performed on computers. Economists use computers to (i) analyze large amounts of data, (ii) solve models with no analytic solution, and (iii) conduct experiments on simulated economies. This course provides instruction on core methods in all three of these areas applied to core models and research questions in Macroeconomics. Students will attain proficiency in the Dynare software, used by academic and policy economists around the world. In addition to these specialized skills, students will also learn practical general programming basics and numerical methods widely applicable to analysis outside of economics.

Macroeconomic models will be taught alongside computational techniques guiding each student through a study of the macroeconomic conditions of a country of their choice. Each student will produce two tangible products: (i) a completed policy document highlighting experiments run on a simulated model economy, and (ii) a one page executive summary of macroeconomic forecasts as one might perform in a private sector analyst positions. These reports will provide students explicit evidence of their skills to be shown to employers or in internship/graduate studies applications.

Prequisites: Students must have taken both Intermediate Micro- and Macroeconomics. Students will be expected to have working knowledge of consumer/firrm optimization. Therefore, students are expected to be comfortable with the calculus of general optimization. Prior knowledge of matrix algebra will be useful, but there are no explicit mathematical prerequisites for the course. However, we will be using math. Students harboring a strong aversion towards math will surely find the course unpleasant. Concepts will be taught as needed.

Texts: The primary resources for this course will include lectures notes and reading assigned from other sources. Some key references are:

- *Dynamic Economics: Quantitative Methods and Applications* ([2])- available free as etext on `libraries.iub.edu`.
- *The ABCs of RBCs* ([1])

Computer Languages This is an applied theory course. All students will be required to do some programming to complete the course. We will use two basic types of programming languages. An introduction to 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 and I will provide some assistance. Knowledge of statistical programming is in high demand in occupations that employ individuals with Economics Bachelor's degrees.

General Programming Languages: For complicated computations we will require a more serious programming language. Instruction will be given in http://www.mathworks.com/products/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++, FORTRAN, and Julia. Students wishing to program in alternative languages may do so as long as they produce free-standing executable files.

We will also make extensive use of http://www.dynare.org/ ([3]), "a software platform for handling a wide class of economic models, in particular dynamic stochastic general equilibrium (DSGE) and overlapping generations (OLG) models. "

Course Requirements:

Syllabus: Students are required to read the syllabus by the second week of class 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. Frequently, class time will be set aside to serve as "workshops" for individual and group projects. To provide incentive, attendance and participation will comprise 25% of the course grade. Three classes may be missed with no penalty, after which each class missed will lower the course grade by 2 points. There are no excused absences. Students found not to contribute to group projects will also be penalized.

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 may 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. 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 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 uploaded to canvas appropriately. Only one submission per group, so make sure all group members names are explicit. Each student's grade will be comprised of 75% a single group grade given by the instructor and 25% an individual score given by other group members.

Examination: Written exams are not appropriate for the format of this course. The two reports summarizing material learned throughout the course will act as a midterm and final. The "Executive

Forecast Report" serves as midterm and is due on or before March 12. The "Policy Report" serves as final and is due on or before May 5.

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

Component	Weight
Attendance	25%
Executive Forecast Report	20%
Policy Report	30%
All Other Assignments	25%
Total	100%

Students can earn up to 100 points from attendance and course work. 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

Exemplary students will receive an $A+$ at my discretion.

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: Students are permitted (and encouraged) to discuss macroeconomics, including answers to problem sets. Copying is not allowed (including copying of code). Academic Dishonesty in the form of cheating, ***failure to cite referenced sources***, or otherwise, will be

reported to the Dean in adherence to College Policy.

References

[1] McCandless, G (2008): "The ABCs of RBCs." Harvard University Press.

[2] Adda, J. and Cooper, R. (2003): "Dynamic Economics: Quantitative Methods and Applications," MIT Press Books.

[3] Adjemian, S., Bastani, H., Juillard, M., Karam, F., Mihoubi, F., Perendia, G., Pfeifer, J., Ratto, M., and Villemot, S. (2011), Dynare: Reference Manual, Version 4, Dynare Working Papers, 1, CEPREMAP