Program in Applied Economics
The Johns Hopkins University
Fall 2017

Computable General Equilibrium Modeling

ECON AS.440.624.81

Course Syllabus

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Office Hours: Email the instructor to set up an appointment to meet via Skype or Adobe Connect

Course Description

This course will provide an understanding of how to independently develop, modify, run and interpret Computable General Equilibrium (CGE) models. CGE models are widely used in the analysis of International Trade, Taxation, Environmental Policy, and other subjects. The specific objectives of this course are as follows: Students will (1) gain an understanding of the underlying economic theory behind CGE modeling; (2) learn how to gather data sources from publicly available information to build CGE models; (3) gain an understanding of the software General Algebraic Modeling Software (GAMS) to run the models; (4) learn how use and modify existing CGE programs for research purposes; (5) be able to write simple CGE programs in GAMS; (6) be able to analyze public policy with CGE models; (7) how to interpret results from CGE models; (8) understand possible extensions of CGE models for potential future research purposes. Analytical skills developed through this class will assist you in building your careers as researchers, public managers, and policy analysts. **Prerequisites:** 440.601 Microeconomic Theory, 440.602 Macroeconomics Theory. Corequisite: 440.606 Econometrics.

Course Overview

The objective of this course is to develop skills to modify & build CGE models. The students will learn the advantages and limitations of different varieties of CGE models. Over the course the complexity of the models will increase to demonstrate the limitations of the approach of the previous model. The students will be exposed to dummy and real life data to highlight the limits that may be imposed by the availability of the data to model and analyse policy issues. As policy issues are time, location and need based, but models structures are relatively restricted by comparison, the students will discover the implementation of policy by their own experiments based on the code provided.
The course will use GAMS software as it is one of the default software used by many CGE modellers and enable one to focus on the issues on hand rather than on code.

Readings

No textbook is required. A list of required and recommended readings are included. Notes as well as reading materials will be made available.

Other equipment/software/websites/online resources

This course requires the use of the following resources: http://www.gams.com For most lectures the free version of the software is sufficient. Students need not invest money from their pocket to buy the software. However, in case any student wishes to purchase the solvers for personal use in anticipation of future work, this is a good time to buy one as the student price is very competitive and provides excellent value for money. We can discuss this in class and you have 14 weeks to take a decision. Don't rush.

Specific Technology Requirements & Skills for this Course

This course requires the use of a computer that complies with the following hardware specifications: Any laptop with a windows OS should do the job. I will be using the windows version of GAMS. In addition, the usual office tools. In case you are not interested in using office you can use Libre Office and that is fine too. GAMS will be taught in class and used regularly in class. You will improve over time. Rome was not built in a day.

Learning online requires some basic knowledge of computer technology. At a minimum, you need to be able to:

- Navigate in and use Blackboard; the Blackboard Student Orientation course on your "My Institution" page
- Create and save MS Word documents; review MS Word training and tutorials for PC users (all versions); Word Help for Mac users
- Find basic resources on the Internet
- Create and organize files & folders on your computer
- Send, receive, and manage email

Assignments and Grading Policy

Course Requirements

Course grade will be based on:

- Homework modelling exercises (60%)
- Midterm exam (20%)
- Final paper (20%)

Grading Policy

Letter Grade   Percentage

A+   97% to 100%
A   93% and less than 96%
A-   89% and less than 92%
B+   85% and less than 88%
B   80% and less than 84%
B-   75% and less than 79%
C   70% and less than 74%
F   0% and less than 70%

This course will follow the [Advanced Academic Programs Grading Policies](#).

Assignment Feedback

The instructor will aim to return assignments to you within 5-7 days following the due date, depending on the length of the assignment. You will receive feedback in the My Grades area of the course which can be accessed via the navigation menu.

Late Policy

You are expected to contact your instructor in advance if you think you cannot meet an assignment deadline. However, if an assignment is late and prior arrangements have not been made with the instructor, the assignment score will be reduced by **7%** each week. (Given 14 weeks, a linear cut) However please don't make this as a regular habit of late submissions.

Extra Credit

Please note any extra credit policies. Extra credit may be given based on originality. There is no bias for or against any student but original thought and ideas will definitely stand out and be acknowledged and awarded accordingly. There will be no specific rules. In a group assignment should there be one, the entire group benefits.

Synchronous Sessions

The instructor may hold live, synchronous sessions in [Adobe](#) [Connect](#). Attendance for synchronous sessions, while not required, is highly recommended. If you cannot attend a synchronous session, you will be responsible for watching the recording at a later time.

Time Management Expectations

It is expected that you look ahead to schedule your time. Plan to complete coursework across several days of the week rather than all in one day. Be sure to consider how group activities impact your schedule as well. Some assignments require that you work on them for multiple weeks. Be sure to review the assignment directions at the beginning of the course so that you can plan your time accordingly. Please seek help before becoming frustrated and spending a significant amount of time to resolve an issue.

Directions for Students

Next Steps: Carefully review the remaining sections of the syllabus before beginning the first week's activities, which are located in the **Lessons** area of the navigation menu in your online course. Once you feel that you are ready to dive into the first week's activities, select **Lessons** on the navigation menu.

Course Policies

Course Participation

Participation Requirements

You are expected to log into Blackboard regularly throughout the week - a daily check-in is recommended. It is your responsibility to read all announcements and discussion postings within your assigned forums.

Online Etiquette

In this course, online discussion will primarily take place in our online discussion board. In all textual online communication, it is important to follow proper rules of online etiquette... communicating with others in a proper and respectful way. For helpful tips, please these [Ground Rules for Online Discussions](#).

Course Protocols and Getting Help

Amendments to the Course

Changes to the course will be posted in the Announcements section of your course. Please check announcements every time that you log into your online course.

Course Communication

The majority of communication will take place within the Discussion forums. When you have a question about an assignment or a question about the course, please contact your instructor, or post your question in the relevant week's discussion forum.

Email Communication

For questions regarding course activities and assignments that would be general interest to other students, please post those in the Discussion forum. If you have a question regarding course activities and assignments of a personal nature, please send an email message to the instructor and observe the following guidelines:

- Include the title of the course in the subject field (e.g., JHU Insert Name of Course).
- Keep messages concise, and check spelling and grammar.
- Sign your full name (the sender's email is not always obvious).

Feel free to contact your instructor with comments, questions, and concerns. All email messages will be sent to you via your JHU email account, so you should be in the habit of checking that account every day or you should ensure that your JHU email account forwards messages to another account of your choice.

Email messages will be responded to within 24-48 hours.

University Policies

General

This course adheres to all University policies described in the academic catalog. Please pay close attention to the following policies:

Students with Disabilities

Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact the coordinator listed on the Disability Accommodations page. Further information and a link to the Student Request for Accommodation form can also be found on the Disability Accommodations page.

Ethics & Plagiarism

JHU Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. Read and adhere to JHU's Notice on Plagiarism.

Dropping the Course

You are responsible for understanding the university's policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Getting Help

You have a variety of methods to get help. Please consult the help listed in the "Blackboard Help" link in the online classroom for important information. If you encounter technical difficulty in completing or submitting any online assessment, please immediately contact the designated help desk listed on the AAP online support page. Also, contact your instructor at the email address listed atop this syllabus.

Copyright Policy

All course material are the property of JHU and are to be used for the student's individual academic purpose only. Any dissemination, copying, reproducing, modification, displaying, or transmitting of any course material content for any other purpose is prohibited, will be considered misconduct under the JHU Copyright Compliance Policy, and may be cause for disciplinary action. In addition, encouraging academic dishonesty or cheating by distributing information about course materials or assignments which would give an unfair advantage to others may violate AAP's Code of Conduct and the University's Student Conduct Code. Specifically, recordings, course materials, and lecture notes may not be exchanged or distributed for commercial purposes, for compensation, or for any purpose other than use by students enrolled in the class. Other distributions of such materials by students may be deemed to violate the above University policies and be subject to disciplinary action.

Code of Conduct

To better support all students, the Johns Hopkins University non-academic Student Conduct Code has been integrated and updated to include all divisions of the University. In addition, it is important to note that all AAP students are still accountable for the Code of Conduct for Advanced Academic Programs.

Title IX

Confidentiality and Mandatory Reporting
As an instructor, one of my responsibilities is to help create a safe and inclusive learning environment on our campus. I also have mandatory reporting responsibilities related to my role as a Responsible Employee under the Sexual Misconduct Policy & Procedures (which prohibits sexual harassment, sexual assault, relationship violence and stalking), as well as the General Anti-Harassment Policy (which prohibits all types of protected status based discrimination and harassment). It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep information you share private to the greatest extent possible. However, I am required to share information that I learn of regarding sexual misconduct, as well as protected status based harassment and discrimination, with the Office of Institutional Equity (OIE). For a list of individuals/offices who can speak with you confidentially, please see Appendix B of the JHU Sexual Misconduct Policies and Laws.

For more information on both policies mentioned above, please see: JHU Relevant Policies, Codes, Statements and Principles. Please also note that certain faculty and other University community members also have a duty as a designated Campus Safety Authority under the Clery Act to notify campus security of certain crimes, as well as a duty under State law and University policy to report suspected child abuse and/or neglect.

Course Outline:

Week 1: Introduction to CGE Models and GAMS (Aug. 28 – Sep.3)

LECTURES
1. L1-Introduction_GAMS

READINGS
1. GAMS —A User's Guide: Tutorial by Richard E. Rosenthal <- free on the web and in GAMS
2. Introductory Concepts and the Graphical Approach to Linear Programming (Chapter 1), Mathematical Programming for Agricultural, Environmental, and Resource Economics, Harry M. KAISER and Kent D. MESSER, John Wiley & Sons, Inc

Week 2: Trade in CGE Models (Sep. 4-10) – September 4 (Labor Day Holiday)

LECTURES
1. L2_Trade_in_CGE_Models
2. L2_Trade_in_CGE_General_Case

READINGS
1. Sameer R Rege (2003) Applied General Equilibrium Analysis of India's Tax & Trade Policy, Chapters 1 & 2

Week 3: Production in CGE Models (Sep. 11-17)

LECTURES
1. L3-Trade_Model_with_Production

READINGS
1. John B. Shoven and John Whalley (1984), Applied General-Equilibrium Models of Taxation and International Trade: An Introduction and Survey, Journal of Economic Literature, Vol. 22, No. 3. (Sep., 1984), pp. 1007-1051
2. Sameer R Rege (2003) Applied General Equilibrium Analysis of India's Tax & Trade Policy, Chapter A: Mathematical Appendix
3. Mary E. Burfisher (2011), chapter 2 Elements of a Computable General Equilibrium Model, INTRODUCTION TO COMPUTABLE GENERAL EQUILIBRIUM MODELS, Cambridge University Press

Week 4: Model with Intermediate Production – Data (Sep. 18-24)

LECTURES
1. L4-Model_with_Intermediate_Use_Data_Calibration

READINGS
1. Sameer R. Rege (2003), Social Accounting Matrix for Modelling Indian Economy, Journal of Applied Input-Output Analysis, Vol. 9, 2003, pgs 35-67

Week 5: Model with Intermediate Production – Code (Sep. 25-Oct. 1)

LECTURES
1. L5-Model_with_Intermediate_Use_Code

READINGS

1. Charles L. Ballard, Don Fullerton, John B. Shoven, & John Whalley (1985) Chapter Title: The Single Period Submodel, A General Equilibrium Model for Tax Policy Evaluation, University of Chicago Press URL: http://www.nber.org/chapters/c11215 , p. 25 - 54

Week 6: Model with Intermediate Production-Saving-Government – Data (Oct. 2-8)

LECTURES

1. L6-Model_with_Savings_Gov_Data_Calibration

READINGS

1. Charles L. Ballard, Don Fullerton, John B. Shoven, & John Whalley (1985) Chapter Title: Data on Household Income and Expenditure, Investment, the Government, and Foreign Trade, A General Equilibrium Model for Tax Policy Evaluation, University of Chicago Press URL: http://www.nber.org/chapters/c11217 , p. 90 - 112

Week 7: Model with Intermediate Production-Saving-Government – Code (Oct. 9-15)

LECTURES

1. L7-Model_with_Savings_Gov_Code

READINGS

1. Charles L. Ballard, Don Fullerton, John B. Shoven, & John Whalley (1985) Chapter Title: The Relationship between Tax Rates and Government Revenue, A General Equilibrium Model for Tax Policy Evaluation, University of Chicago Press URL: http://www.nber.org/chapters/c11222 , p. 188 - 202

Week 8: Midsem Exam L8 (Oct. 16-22)
NO LECTURE NO READINGS

Week 9: Model with Intermediate Production-Export-Imports – Data (Oct. 23-29)

LECTURES

1. L9-Model_with_IUse_Exp_Imp_Data_Calibration

READINGS

1. Armington, P., 1969, A theory of demand for products distinguished by place of production, IMF Staff Papers 16, 159-176.
2. Jaime de Melo, Sherman Robinson, Product Differentiation & Treatment of Foreign Trade in Computable General Equilibrium Models of Small Economies, Journal of International Economics 27 (1989) 47-67. North-Holland

Week 10: Model with Intermediate Production-Export-Imports – Code (Oct. 30 – Nov.5)

LECTURES

1. L10_Model_with_IUse_Exp_Imp_Code

READINGS

1. Charles L. Ballard, Don Fullerton, John B. Shoven, & John Whalley (1985) Chapter Title: Alternative Models of the Foreign Sector, A General Equilibrium Model for Tax Policy Evaluation, University of Chicago Press URL: http://www.nber.org/chapters/c11223 , p. 203 - 234.

Week 11: Introduction to Dynamics – Sequential Dynamics (Nov. 6-12)

LECTURES
1. L11_Sequential_Dynamics

READINGS
1. Charles L. Ballard, Don Fullerton, John B. Shoven, & John Whalley (1985) Chapter Title: Dynamic Consideratons, A General Equilibrium Model for Tax Policy Evaluation, University of Chicago Press URL: http://www.nber.org/chapters/c11219 , p. 140 - 152

Week 12: Combining CGE Models with other PE Models – Case Study Energy (Nov. 13-19)

LECTURES
1. L12_Combining_CGE and PE Models for Energy

READINGS
1. Christoph Böhringer and Thomas F. Rutherford (2007), Combining Top-Down and Bottom-up in Energy Policy Analysis: A Decomposition Approach, Discussion Paper No. 06-007 ftp://ftp.zew.de/pub/zew-docs/dp/dp06007.pdf

HOLIDAY – Thanksgiving Week (Nov. 20-26)

Week 13: Summary (Nov. 27 – Dec. 3)

LECTURES
1. L13_Recapitulation

READINGS
1. Lofgren, Hans; Lee Harris, Rebecca and Robinson, Sherman (2002). A Standard Computable General Equilibrium (CGE) Model in GAMS. Microcomputers in Policy Research 5. International Food Policy Research Institute (IFPRI). http://www.ifpri.org/publication/standard-computable-general-equilibrium-cge-model-gams-0

Week 14: Final Term Paper (Dec. 4 - 10)