Instructor: Tae Bong Kim  
email: tk22@duke.edu  

Time and Location:  
Office Hours:  

Textbook: Lecture slides, Time Series Analysis (Hamilton), ...  

Material:  
It is recommended for students to have taken Econ 210 Macroeconomics as a prerequisite for Computational Macroeconomics. But students who acquired fair amount of numerical skills and computational skills can talk to me before registering the course. The class materials will mainly rely on lecture notes and slides. This course not only involves analytical study of macroeconomic theory but also a practical computation and hence requires the use of Matlab software. Anyone who is taking this course is recommended to have Matlab software (with symbolic toolbox and statistical toolbox installed) in his or her computer or at least have the access to this software via departmental clusters. Some of classes will be devoted to only presenting Matlab codes under the presumption that students are not familiar with Matlab. However, it is strongly recommended for students who are taking this course to preview the basic commands and the interface of Matlab before the semester starts. Students will be encouraged to form a group to study together but assignments will have to be submitted individually.  

Grading: There will be roughly biweekly computation assignments (5 or 6 assignments), and a final project. If time allows, we will have students’ presentations and discussions toward the end of semester. They will count toward the grade as follows.  

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>60%</td>
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<tr>
<td>Participation</td>
<td>5%</td>
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<tr>
<td>Final</td>
<td>35%</td>
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Final Project:  
Students will learn a standard sticky price model (or asset pricing theories if students want) in the class and the final project will be asking computational exercises based on this model. In short, the project will ask students to summarize the set of equilibrium conditions, log-linearize around the steady state, solve the model, derive the state space form representation of a linear model, simulate the economy under assumed values of parameters and finally estimate a set of parameters in the model with simulated data. The project will ask students to conduct all skills learned throughout the semester and type in Latex file for submission.
Description of the Course

The primary purpose for this course is to familiarize with macroeconomic models and computational tools. Master students who are interested in advancing into phd program will mostly benefit from this course since it will teach preliminary tools for macroeconomic studies in phd levels. Simple macroeconomic models of Dynamic Stochastic General Equilibrium will be reviewed and will be used as a toy example to learn numerical approaches and empirical approaches. More specifically, Real Business Cycle theory and Sticky Price models for monetary policy are the topics of the study, linearization around steady state by Schmitt-Grohe & Uribe toolkit is the numerical method and Bayesian estimation of DSGE by An & Schorfheides(2006) will be the empirical approach studied. Also, by doing the final project students who are from contral banks and research institutions where monetary policy is conducted will grasp how to practically implement modern monetary policy research. The first half of the course will focus on numerical analysis and the second half will be devoted to teach empirical analysis and sticky price model.

Lecture Topics

1. Preliminaries for Matlab
2. Real Business Cycle theory
3. Linearizing DSGE models with Taylor expansion around deterministic steady states
4. Solving DSGE model with SGU toolkit and State Space form Representation
5. Impulse Response and Simulation of DSGE models
6. Duality with Dynamic programming and Value function iteration(optional, if time permits)
7. Calvo Sticky Price model for Monetary Policy
8. Empirical approaches and Likelihood principle(optional, if time permits)
9. Evaluation of Likelihood of DSGE models with Kalman Filter
10. MCMC Algorithm and Bayesian Estimation