

QUANTITATIVE TECHNIQUES IN ECONOMICS

Sang Yoon (Tim) Lee
Toulouse School of Economics

Spring 2018
2nd Module

1. Basic Information about the Course

Course Website: <http://www.syleetim.net/numquant/numquant.htm>
Instructor: Tim Lee, email: sylee.tim@tse-fr.eu
Time: TBD
Dates: TBD
Location: TBD
Prerequisites: Elementary numerical coding

2. Course Description

This is the 2nd half of a numerical methods course at the doctoral level. By now you would have learned:

1. Dynamic programming and value function iterations
2. Solving an incomplete markets model with heterogeneous agents.

In the latter half of this course taught by me, we will go through more of the basics, that will help you implement the above steps faster. Specifically, although I am also a macro-economist, **the goal is to NOT focus only on methods used in macroeconomics but techniques that can be applied more generally across all fields.** Namely, we will cover

1. Numerical differentiation, integration and quadratures
2. Numerical interpolation and splines
3. Uni/Multivariate equation solvers and optimization routines
4. Sorting methods and if time permits, discrete choice example
5. If time permits, incomplete markets model with occupational choice

Hopefully classes are held in the computer lab, where we can go over codes. Unfortunately (or perhaps fortunately, depending on your desire to learn programming languages), I will be mostly using Fortran for my part of the course. So there will also be a primer on Fortran,

with additional discussion on lower-level languages along the way.

I hope the course becomes a venue where we can learn together. Feel free to recommend something else you would like to learn, and also to correct anything I say in lecture that sounds wrong/you disagree with.

Objectives and Goals By the end of the course, you should be able to draw a flowchart of how you would go about solving any numerical problem you may encounter in economics, and be aware of at least 3-4 methods you could use at any step along said flowchart.

3. Assignments

There will be some exercises in class that you will be expected to finish but not graded; at the end of the course you will have a small take-home exam in which you will need to present your results graphically.

**I will talk about the basics but not specifically teach how to draw graphs; this will be up to you (use any programming language to visualize your results).*

4. Textbooks

- *Numerical Methods in Economics*, 2nd ed., Kenneth Judd, Pearson Addison Wesley, 2008.
- *Dynamic General Equilibrium Modeling*, 2nd ed., Burkhard Heer and Alfred Maussner, Springer, 2009.

In addition, especially for the basics, I will heavily rely on:

<http://apps.nrbook.com/fortran/index.html>