Syllabus (2602) Fall 2013 7002 Quantitative Methods II

Rudi von Arnim, rudi.vonarnim@utah.edu, OSH 339A, (801) 587 8327. Lecture: Tuesday 11am–2pm. Office hours: After lecture and with appointment.

This course introduces you to mathematical methods for economists. We study selected linear and non–linear dynamic methods. The textbook is Gandolfo (2010). You will learn to work with differential and difference equations, and to solve and assess systems of such equations. Where appropriate, we might use material from Lorenz (1993), Chiang (1999) and Hoy et al. (2011). We will occasionally use a spreadsheet program to analyze and simulate dynamic processes numerically.

There will be a midterm and a (cumulative) final examination, each counting 50% towards the final grade. We might hold some quizzes. Gandolfo (2010) has exercises (and provides answers); it is strongly recommended to study these exercises. Grades will be curved. The grade distribution is as follows: $100 \geq A \geq 90$; $90 > B \geq 80$; $80 > C \geq 70$ etc.

- Week 1–3: **Difference equations**: 1^{st} and 2^{nd} order difference equations, mostly linear and autonomous. Introduction to phase diagrams and stability analysis. **Examples**: Cobweb; growth; multipliers, multiplier–accelerator model.
- Week 4–6: **Differential equations**: 1^{st} and 2^{nd} order differential equations, mostly linear and autonomous. **Examples**: Partial price adjustment; demand–determined goods market adjustment; IS/LM; Solow growth; partial price adjustment with entry & exit; flexible accelerator; Euler approximation to 2^{nd} order differential equation.
- Week 7: **Midterm exam**. Tuesday October 8, 2013, 11am–1pm in OSH360.
- Week 8–11: **Linear systems**: Linear systems of differential and difference equations, mostly $2x2$. Stability analysis and phase diagrams. **Examples**: Partial price adjustment (with entry & exit), Dornbusch model of exchange rate overshooting, IS/LM, 2–country model with demand–determined goods market closure.
- Week 12–15: **Non–linear systems**: Non–linear systems of differential equations, $2x2$. Stability analysis, phase diagrams, linearization, and a first look at dynamic optimization. **Examples**: Kaldor's trade cycle, Goodwin's predator–prey dynamics, and the Ramsey problem.
- Week 16: Final exam. Tuesday December 17 11am–1pm in OSH360.)

References

Chiang, A. C. (1999). *Elements of Dynamic Optimization*. Waveland Pr Inc.

Gandolfo, G. (2010). *Economic Dynamics*. Springer, 4th edition.

Hoy, M., Livernois, J., McKenna, C., Rees, R., and Stengos, A. (2011). *Mathematics for Economics*. The MIT Press, 3 edition.

Lorenz, H. (1993). *Nonlinear Dynamical Economics and Chaotic Motion*. Springer.