

Mathematics

Module III – Dynamic analysis (12 hours course, plus 4 hours tutorial)

Prof. Michele Longo

1. *Ordinary Differential Equations* (SHSS: 5.1-8, 6.1-9, 7.1-4; SB: 24.1-6, 25.1-5)
 - 1.1. General theory.
 - 1.2. First order ODEs.
 - 1.3. Constant coefficients linear ODEs.
 - 1.4. Two-dimensional linear systems with constant coefficients.
 - 1.5. Two-dimensional autonomous systems.

2. *Difference Equations* (SHSS: 11.1-5, 11.7; SB: 23.2)
 - 1.1. General theory.
 - 1.2. First order DEs.
 - 1.3. Constant coefficients linear DEs.
 - 1.4. Two-dimensional linear systems with constant coefficients.

3. *Deterministic Optimal Control* (SHSS: 9.1-4, 9.6-7, 9.9, 10.1-2)
 - 3.1. Continuous-time deterministic control problems.
 - 3.2. One state and one control variable.
 - 3.3. Several state and several control variables.
 - 3.4. Sufficient conditions.
 - 3.5. Discounting and current values.

References

- Carl P. SIMON and Lawrence BLUME (SB), *Mathematics for Economists*. W.W. Norton & Company, 1994.
- Knut SYDSAETER, Peter HAMMOND, Atle SEIERSTAD, Arne STROM (SHSS), *Further Mathematics for Economic Analysis*, Prentice Hall, 2005.