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. *Deterministic Optimal Control* (SHSS: 9.1-4, 9.6-10, 10.1-2)
    2.1. Continuous-time deterministic control problems.
    2.2. One state and one control variable.
    2.3. Interpretation of the costate variable
    2.4. Several state and several control variables.
    2.5. Sufficient conditions.
    2.6. Discounting and current values.
    2.7. Bang-bang control.
    2.8. Terminal payoff and free final time.

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.