

# Numerical methods for Functional Differential Equations

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**Timetable:** 16 hrs. The course will take place in 2013 (March or April).

**Course requirements:** Numerical methods for ordinary differential equations.

**Examination and grading:** written examination.

**SSD:** MAT/08 Numerical Analysis.

**Aim:** to introduce students to functional differential equations and their numerical solution.

**Course contents:**

1. Functional Differential Equations (FDEs). Retarded Functional Differential Equations (RFDEs). Particular types of RFDEs: Delay Differential Equations (DDEs), Integro-Differential Equations (IDEs), State-Dependent DDEs (SDDDEs), State-Dependent IDEs (SDIDEs). Neutral Functional Differential Equations (NFDEs). Mathematical models based on such equations.
2. Existence and uniqueness of the solution and continuous dependence on the data for an initial problem of RFDEs.
3. Continuous Runge-Kutta (CRK) methods for RFDEs. Discrete order, uniform order and global order of a CRK method for RFDEs. Order conditions.
4. Stability of CRK methods for RFDEs.
5. Boundary value problems for FDEs.