

**Course title:**

Nonlinear Methods for Analyzing Complex Behaviour in the Behavioral Sciences

**Duration [number of hours]:** 15

**PhD Program [MERC/MPS/SPACE]:** MERC

**Name and Contact Details of Lecturer(s):**

Michael Richardson

**Lecture timetable (CEST hours)**

- Tuesday, June 13, from 10 to 13, Classroom 4, SSM
- Wednesday, June 14, from 14 to 17, Classroom 4, SSM
- Thursday, June 15, from 10 to 13, Classroom 4, SSM
- Tuesday, June 20, from 10 to 13, Classroom 4, SSM
- Wednesday, June 21, from 14 to 17, Classroom 4, SSM

**Broadcast on Zoom:**

<https://us02web.zoom.us/j/2878746666?pwd=WElleXJVbExjVVR4WERxdU1YNIRgZz09>

Meeting ID: 287 874 6666

Passcode: merc\_zoom

**Course Description [max 150 words]:**

A practical overview of the nonlinear analysis and time-series methods that can be employed to uncover the dynamics of complex behavioral processes, with particular focus on biological and human behavior. The class includes a mixture of lecture and in-class exercises to provide students with the necessary skills to employ the methods for their own research. The course requires that students have access to MATLAB (2019 or newer).

**Syllabus [itemized list of course topics]:**

- Class 1: Introduction to Nonlinear Methods and Time-Series Data
- Class 2: Fractal Methods
- Class 3: Phase Space Reconstruction and Recurrence Methods I
- Class 4: Recurrence Methods II
- Class 5: Other Methods, Application and Data Collection for Analysis Project

*Each class is 3 hours (total of 15 hours). Dates to be announced.*

**Assessment [form of assessment, e.g. final written/oral exam, solutions of problems during the course, final project to be handed-in etc]:**

- Completed in-class exercises (complete during or 1-day following class).
- Complete analysis project – 3-page written report (due one week after the last class).

**Suggested reading and online resources:**

Readings and Resources (software and example data) will be available at:

<https://xkiwilabs.com/nonlinearmethods/>