Dynamics of Development - MSc. Option Spring 2006

Course Handbook

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Aims and Objectives:

The aim of this course is to provide students with an in-depth understanding of the dynamical systems approach to cognitive development. Based on the principles of dynamical systems theory, novel theories of the developmental processes involved in perception, action and cognition are presented in the light of computational modelling efforts based on evolutionary and autonomous systems techniques. Students are given a chance to apply a hands-on approach to concrete problems as well as critically evaluate existing theoretical frameworks aimed at unifying recent research in embodied cognition, neuroscience, and neural development.

Topics include:

- The dynamical systems approach to embodied cognition.
- Behavioural plasticity in animals and humans.
- Multi-timescale processes in agent/environment interaction.
- Self-organized value-dependent development.
- Dynamical and autonomous systems modelling for developmental systems,
- Evolution of developmental strategies.
- Aspects of neural development.
- Aspects of social development.
- Ageing and dynamics of developmental disorders.

Course structure:

The taught element of the course will comprise one lecture and one seminar each week, starting in week two of term. The lecture is intended to give students a grasp of the issues need to understand and evaluate that week’s seminar reading.

Two readings will be set for each seminar with a short presentation on each paper before general discussion. Presenters will be selected at the previous week's seminar.

Prerequisites:

Having taken either Artificial Life, Animal and Machine Intelligence or Philosophical Foundations of Cognitive Science in the Autumn term.
Provisional schedule:

Week 1: Introduction. What is development?

Seminar reading:


2: Ontogenetic adaptation: animals, infants & robots.

Seminar reading:


3: Evolution and development.

Seminar reading:


4: Dynamical systems approaches.

Seminar reading:


5: Developmental systems.
Seminar reading:


6: Developmental Models

Seminar: Project presentations.

7: Robotics


8: Play.

Seminar: Session reserved for project related implementation issues.

9: Modelling Social Interaction.

No seminar.

Assessment:

You will be assessed (100%) on a choice of one of the following options:

1) **5,000 word** term paper to be based on a programming or robotic project.

2) **5,000 word** extended essay.

To be handed in before **12 noon** on the **first day** of **summer term**.

Project/essay topics to be agreed in advance with course tutors - a short project proposal or an extended abstract should be handed in by **week 8**.

Refer to Handbook for Candidates for MSc degrees for regulations on late submissions.
Additional Reading List:


Other sources:


Conferences/ networks: Epigenetic Robotics, CNet.