

Tentative Syllabus for Artificial Life and Swarm Intelligence

Revised Sunday, August 26, 2012

BIOL 4910-002/BIOL5910-002 or CSCI 4957/5947-004

Artificial Life and Swarm Intelligence (4 credits)

Fall 2012, Tuesday 12:45-4:45, Brown building, Lecture room 214

Open for 20 students

Instructor: Thomas Schmickl (office: 207 Brown Hall; email: thomas.schmickl@uni-graz.at) and Istvan Karsai (office: 363 Brown Hall; email: karsai@etsu.edu)

Office hours: After the class or by appointment (email please, no phone)

This course is an intensive course concerning math and tech.

Purpose: Introduction to the fields of artificial life, digital life, and swarm intelligence. The course will teach principles of biological self-organization, collective behaviors and collective decision-making.

Grading:

- 1.) 50% of the achievable points can be achieved by submission of the correct, satisfying and complete submission on the individual chapters of the workbook (5 points per workbook).
- 2.) 20% of the achievable points can be achieved by the exam that will be held during the course at approx. halftime.
- 3.) 30% of the achievable points will be given by the capstone presentation of the final group project.
- 4.) Extra points can be gained by active involvement in the course by presenting interesting ideas or by doing additional interesting analysis.

Undergraduates:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93%	90%	87%	83%	80%	77%	73%	70%	67%	63%	60%	<60%

Graduates:

A	A-	B+	B	B-	C+	C	F
93%	90%	87%	83%	80%	77%	73%	<70%

Book: Scott Camazine et. al. Self-Organization in Biological Systems. PUP. 2001

Recommended reading: Railsback S.F. & Grimm V. Agent-Based and Individual-Based Modelling. PUP. 2012

Writings:

- Writing Assignments need to be submitted before the deadline (before the course unit of the following week). Submission after the deadline will decrease the points.
- 1 page means: 1 inch margin around. Single line (single space = no double), 12 points font. Diverting from the format and length will result decrease of the points.
- Assignments and presentations need to be original. In case of academic misconduct all participant will be reported to the ETSU committee, as the law of ETSU requires.
- Students with disabilities and special requirements need to discuss this with the instructor after the first class.
- A thumb drive will help to store data and to run small program.
- Students have a responsibility to have a working email address and a working internet connection to the online tool at <http://zool33.uni-graz.at/lernen>

Tentative Schedule:

An invited professor, who will tailor the course content to the existing knowledge of the audience, will teach this class. Thus chosen topics and teaching intensity of specific topics might deviate from the originally planned level as the course progresses in time.

In case that work was not finished in class, it will be automatically be assigned as homework up to the next week.

Date	Topics	Assignment (read before class)	Assignment (work after class)
28 th August	Introduction to Self-organizing systems, Game of life	p.7-p.14 in Camazine et al.	
4 th Sept.	Game of life (cont.), Pattern formation, Turing systems	p.72 (bottom) – p.87 (top) in Camazine et al.	Analysis: Compare GOL with Verhulst model! How does long-term population depend on initial population?
11 th Sept.	Agents, Random walk		
18 th Sept.	Scaling law, Levy walk, Percolation theory		Analyze the effect of the strength of fire on the animal population!

25 th Sept.	Termite buildings & Sorting of ants	p.341 - p.355 in Camazine et al. p.377 - p.391 in Camazine et al.	
2 nd Oct.	Slime mold aggregation I	p.95-p.103 in Camazine et al.	Analysis: How does aggregation success depend on each of the used model parameters?
9 th Oct.	Slime mold aggregation II, mid-term exam		
23 rd Oct.	Ant trails I	p.217-p.228 in Camazine et al.	Analysis: How is the exploitation strategy (serial vs. parallel) affected by the used model parameters?
30 th Oct.	Ant trails II		
6 th Nov.	Honeybee foraging economics	p.189-p.201 in Camazine et al. (incl Fig. 12.7 & 12.8)	Repeat the experiments depicted in Figs. 12.3, 12.7, 12.8, 12.11 & 12.12 with the multi-agent model and compare it to the results of the book!
13 th Nov.	Summary & Review; Assignment of groups and projects.		
20 th Nov.	Concepts of final project		
27 th Nov.	Analysis of project results		
4 th Dec.	Final project presentation		

The general syllabus attachment is generally available online at <http://www.etsu.edu/reg/academics/syllabus.aspx>.
There is also a PDF form available for download for your reference.

The syllabus attachment is designed to help you as quick reference tool to several resources on Campus such as the calendar, offices, and hours of operation.