Bioinspired Robotics

BIOL 698 Spring 2022
Wednesday: 11:30PM – 2:20PM
@ Flammang Lab

Instructor:
Prof. Brooke Flammang flammang@njit.edu
office hours by appointment

COURSE DESCRIPTION: This course emphasizes interdisciplinary design collaboration and incorporates studying primary biological literature with the design and construction of a device based on biological and physical principles. This exposes the students to the precise experimental methods and detailed record-keeping practices that are needed to produce high-quality scientific data. Experience with coding is beneficial but not required.

Course prerequisites: Hum 102, R120:201/202, BIOL 205/206 and BIOL 321/610.

Course outline:

Dates	Topics	Assignments
W 19 Jan	Intro to course	Flammang et al. 2016
W 26 Jan	Biomechanics 101	Crawford et al. 2020
W 2 Feb	3D modeling	Ashley-Ross 1994
W 9 Feb	3D modeling	Standen et al. 2014
W 16 Feb	Basic Arduino programming	King et al. 2011
W 23 Feb	Basic Arduino programming	Kawano & Blob 2013
W 2 Mar	Project Workshop	Boisevert et al. 2013
W 9 Mar	Project Workshop	Nyakatura et al. 2014
W 16 Mar	*Spring Break – No Class*	
W 23 Mar	Project Workshop	Hutchinson 2011
W 30 Mar	Project Workshop	Pierce et al. 2013
W 6 Apr	Project Workshop	Pierce et al. 2012
W 13 Apr	Project Workshop	Shubin et al. 2014
W 20 Apr	Project Workshop	Clack 1997
W 27 Apr	Robot demonstration	Bioinspired Design Summary Due

Grading: 40% Paper discussion

40% Project participation

20% Project summary

Grading Scale	
A	88-100
B+	81-87
B	74-80
C+	67-73
C	60-66
D	50-59
F	0-49

Learning expectations and assessment:

This course is designed to introduce students to the physical mechanisms that biological organisms have evolved to interact with their environment. Bioinspired robotic models are becoming increasingly useful in both experimental biology and applied technologies when engineered to take advantage of the biological phenomenon found in nature. Students will be expected to read the assigned primary literature and be actively involved in discussions on their content. Each student will have to play an active role in project design, development, and implementation, as well as writing an individual project summary.

At the end of this course students should have the necessary skills to:

1) read and communicate scientific information
2) design 3D components
3) actuate robotic structures
4) experimentally explore evolutionary hypotheses using robotic models

Class Policies:

Cell phones: The use of cell phones during class or exam times is prohibited.

Makeup Exam Policy: There will be no makeup exams, except in rare situations where the student has a legitimate reason for missing an exam, including illness, death in the family, accident, requirement to appear in court, etc. The student must notify the Biological Sciences office and the Instructor that he/she will miss an exam. In all cases, the student must present proof for missing the exam TO THE DEAN OF STUDENTS OFFICE, e.g., a doctor's note, police report, court notice, etc., clearly stating the date and times.

Academic Integrity: Students are reminded of the Honor Code each one has agreed to abide by (at Rutgers or NJIT). Violations of Academic Integrity will be dealt with according to the guidelines indicated in the NJIT Academic Honor Code (http://integrity.njit.edu/index.html). Please re-read Article III of the Honor Code (page 4), which describes conducts that are considered unacceptable (cheating, violating the US Copyright law, etc). Rutgers has similar rules (http://www.ncas.rutgers.edu/oas/ai).