**The University of Akron**

**Buchtel College of Arts and Sciences**

**Myers School of Art**

**7100: 316 Biodesign**

7100:316 Fall 2018 3 credit hours

Folk Hall, Room 148

Monday Wednesday 2:45-5:30pm (Wednesday open lab time)

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| --- | --- | --- | --- | --- |
| **Instructor:** | Petra Gruber |  | Phone: | 330 972 6303 |
| Office: | Folk 181 / ASEC E505 |  | Email: | pgruber@uakron.edu |

**COURSE DESCRIPTION**

The course Biodesign combines an introduction into biomimicry/biomimetic design with a studio design exercise, using nature as a model for creating innovative solutions.

* The lecture part contains an introduction into the basics of biomimetics/biomimicry, and the intersection of biology and design.
* The studio or design part is a solution based biomimetic approach, that takes on nature to inform a novel design project. For this part independent student work in research and design is required. The selection of the biological role model, research, abstraction and application to a new design is carried out in continuous interaction and feedback involving external sources and experts.
* The course outcomes are thematic presentations of specific research themes in nature and a design project presentation including graphics, digital and analog models.

Each year, the course focuses on a specific aspect that may be connected to a current research project or main theme. Field trips to places with high biodiversity are integrated into the schedule.

The course is open to students from different disciplines in the arts, sciences and engineering. Elements of interdisciplinary collaboration and vertical teaching is integrated according to level and expertise of the group.

The course is held weekly on Tuesdays and Thursdays. The time allocated on Thursdays is to be spent independently for research, lab and design activities.

**RATIONALE**

* For the students, the goal of the course is to give a basic overview over the current activities and developments in the field of biomimetic design, together with an understanding and application of biomimetics as a methodology of information transfer from nature to design.
* The course will increase and foster interdisciplinary research between students from different departments.
* The course will add to the attractiveness of Myers school of Arts for students.
* The introduction of biomimetics into undergraduate and graduate programs will foster the further development of the BRIC initiative.

**LEARNING OUTCOMES**

* Increase knowledge about the field of biomimetic design
* Ability to apply of the methodology of biomimetics in a design context
* Increase critical thinking and analytic capacity in design
* Sythesize biological information and design problems and create new design solutions

**REQUIRED/OPTIONAL TEXTS**

Parts of the following books and a selections of specific articles and papers are given as reading assignments and discussed in class:

* Bhushan, Bharat. "Biomimetics: lessons from nature–an overview." (2009): 1445-1486.
* Gruber, Petra. "Biomimetics in architecture: architecture of life and buildings". (2010) Wien: Springer.
* Thompson, Darcy Wentworth. "On growth and form." On growth and form. (1942).
* Vincent, Julian FV, et al. "Biomimetics: its practice and theory." Journal of the Royal Society Interface 3.9 (2006): 471-482.

**COURSE GOALS/LEARNING OBJECTIVES**

|  |  |  |
| --- | --- | --- |
| **Objectives** | **Applicable Standards: [See above]** | **Assignments/Assessments** |
| Become familiar with biomimetics design |  | Attendance of the lecturesReading responses, Research presentation |
| Become familiar with biomimetics as a methodology |  | Analogy research, finding of biological role models, translation concepts |
| Interdisciplinary collaboration |  | Design project |
| Become familiar with the other discipline's tools |  | Research and design presentations |

**COURSE CALENDAR**

|  |  |  |
| --- | --- | --- |
| Week | Lecture | Studio/Design project |
| 1 | Introduction | Introduction phase |
| 2 | Background and Basics |  |
| 3 | Methods and Tools | Research and analysis phase |
| 4 | Biomimetic in Design |  |
| 5 | Concept presentation | Abstraction and concept phase |
| 6 | Studio - special topics |  |
| 7 | Studio - special topics |  |
| 8 | Studio - special topics |  |
| 9 | Studio - special topics |  |
| 10 | Midterm presentation | Intermediate design phase |
| 11 | Studio - review |  |
| 12 | Studio - review |  |
| 13 | Studio - review |  |
| 14 | Studio - review |  |
| 15 | Final presentation | Final research and project presentation |

**INSTRUCTIONAL STRATEGIES/ACTIVITIES**

Activities included in the course are lectures, video presentations, guest lectures, field trips, basic research activities, studio work, reviews and presentations.

Independent student work includes basic research on the role models, research in the field, libraries, biology and engineering labs, and contacting and requesting information from external organizations and experts. Production of prototypes and collaboration with the FabLab are optional.

**MATERIAL COSTS**

# The costs for materials depend highly on the nature of the project and usually range from 30-100$.

# TECHNOLOGY REQUIREMENTS

Basic computer equipment, optional photo/video equipment, drawing tools, optional 3D software.

**EVALUATION/STUDENT ASSESSMENT/ATTENDANCE POLICY MYERS SCHOOL OF ART**

The assessment of the course is 20% reading response and class activity, and 80% design project. Written summaries have to be delivered for research on biological solutions, concept abstract and design concept. The final design project is presented with a poster or a power point presentation including all relevant steps of the design process and an application scenario.

Prototypes and models are requested according to thematic area and concept.

Students are required to attend all class meetings. Students may not miss more than one week’s worth of class time without penalty. For each absence in excess of one week, your final course grade will drop by one grade (e.g., from B to B-).

The following grade equivalencies apply:

|  |  |
| --- | --- |
| A | 93 |
| A- | 90 |
| B+ | 87 |
| B | 83 |
| B- | 80 |
| C+ | 77 |
| C | 73 |
| C- | 70 |
| D+ | 67 |
| D | 63 |
| D- | 60 |
| F | 0 |

Attendance is recorded each class period. For grading purposes, three late arrivals or early departures will equal one absence. Punctuality is expected. All papers and lessons must be typed and turned in on the due date.

**PREREQUISITES**

Sophomore standing or approval of instructor

**UNIVERSITY AND MYERS SCHOOL OF ART POLICIES**

Refer to the Myers School of Art Website, Academic Tab: Resources for Faculty and Staff

http://uakron.edu/art/academics/resources-for-faculty-and-staff.dot

• The University Code of Student Conduct, Ethics and Standards

• Myers After Hours Access Policy

• Myers Attendance Policy

• Title IX Information

• Office of Accessibility and Accommodations

• Myers Studio Use Policy

**BIBLIOGRAPHY**

* Bhushan, Bharat. "Biomimetics: lessons from nature–an overview." (2009): 1445-1486.
* Gruber, Petra. "Biomimetics in architecture: architecture of life and buildings". (2010) Wien: Springer.
* Imhof, Barbara, and Petra Gruber, eds. "Built to Grow-Blending Architecture and Biology." Birkhäuser, 2015.
* Myers, William. Bio Design. Museum of Modern Art, 2012.
* Thompson, Darcy Wentworth. "On growth and form." On growth and form. (1942).
* Vincent, Julian FV, et al. "Biomimetics: its practice and theory." Journal of the Royal Society Interface 3.9 (2006): 471-482.

**SIGNATURE PAGE**

I have read and understand the policy/contract requirements for this course.

Course Subject, Catalog and Section Number: 7100:3XX

Course Title: Biodesign

Term/Year: Fall 2018

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| Instructor: Petra Gruber |  |  |  |  |

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