Research – Development – Innovation Syllabus

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<table>
<tr><td rowspan="5">1. General Informations</td><td colspan="5">Course title: Biomaterial prototyping lab - BioDesign Challenge New York</td></tr>
<tr><td colspan="5">Course coordinator(s) / lecturer(s): Malu Lücking, Ferenc Kovács-Nagy

Contact details: malu.lucking@mome.hu, kovacs.nagy.ferenc@mome.hu</td></tr>
<tr><td>Level and Code:</td><td>Position in the Curriculum:</td><td>Recommended semester: Spring 2024</td><td>Credits:5</td><td>Teaching hours: 48 h
Student workload: 90 h</td></tr>
<tr><td>Related codes:</td><td>Type: lecture/ seminar/practice/combined</td><td>Is it open to sign-up as an elective?</td><td colspan="2">Specific pre-conditions to sign-up as an elective:</td></tr>
<tr><td colspan="5">Interlinkages / prerequisites, parallel units: -</td></tr>
<tr><td>2. Targeting</td><td colspan="5">Aims and principles of the course:

Learn about biomaterials and participate in the Biodesign Challenge, with the possibility of presenting your project in New York!

In this course, you will learn about Biodesign, an emerging design field, integrating principles and concepts of biology and technology in the design process for innovative and circular design solutions. The course is a part of the Biodesign Challenge in New York, so the most outstanding projectteam will have the chance to travel to New York in June, showcasing their project and presenting it to an international jury.

Biomaterial design for change
As designers we have a unique and important role to play in the emerging circular economy. 80% of a product's environmental impact is influenced by decisions made at the design stage (Ellen McArthur foundation) and conscious material choices play an important role in this.

This course offers students the opportunity to delve into the universe of biomaterials in design through workshops. Participants will engage in hands-on prototyping in the biolab, familiarizing themselves with bio fabrication methods and tools. The curriculum encompasses learning how to establish experimentation protocols and co-create materials with living organisms such as bacteria and fungi. Examples include crafting environmentally friendly leather from mushrooms, developing algae-based plastics for packaging, and using bacteria to dye fabric, thereby reducing toxic chemical usage.

As many design students and creators lack access to biolabs, posing a challenge in engaging with this emerging design field, in the course's second phase, we will translate the insights from experiments and protocol development, into constructing fabrication tools for innovative biomaterial creation. This involves conceptualizing and building open-source kits and/or machinery to grow biomaterials outside a lab environment. By empowering individuals to build their own affordable tools for biomaterial production, our aim is to accelerate the shift towards more sustainable materials in design.</td></tr>
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	This course will be bilingual, but knowledge of the English language is required.
	Intended learning outcomes / professional and transitive competencies: (in accordance with the subject description) **Knowledge:** o Learning about biomaterial terminologies o Exploring biomanufacturing tools and methods to create new and dynamic material through collaboration with living organisms o Developing concepts and manuals for open-source tool building including digital fabrication o Going through all stages of a design process from inspiration, concept, prototyping to final presentation **Skills:** o Hands-on development of biomaterials and manufacturing techniques in design context o Planning and building of small DIY tools and machines through rapid prototyping o Co-creation with living organisms and working in interdisciplinary teams o Presentation (diagrams, film, photo) and communication skills **Attitudes/attributes:** Environmental consciousness and the responsibilities of designers in the transition towards a circular economy by using bio-informed and bio-intelligent design strategies. **Autonomy and Responsibility:** Create an original and complex Biodesign project in teams from concept to experimentation and final presentation.
3. Itinerary	Course content (topics and themes): o Biodesign methods, research techniques o Biomaterial leather alternative making o Biomaterial dye of fabric making o Other bio fabrication tools o Material prototyping o DIY tool development with digital fabrication, Arduino, Laser cut and more o Video and presentation
	RDI methods and tools used in the course: o Data collection, analysis and evaluation methods o Artistic and design cognition and creative methods o Methods for developing ideas and concepts o Product development methods o Testing and validation methods o RDI process management methods o Research collaboration methods o Documentation and communication methods o Comparative critique and evaluation of RDI elements, processes and methods o Self-reflection on the performance of RDI processes and tasks
	Specificity of the learning process: Drawing insights from hands-on workshops focused on creating biomaterials using various microorganisms, students will actively engage with living matter and scientific procedures. This hands-on experience will provide them with a profound comprehension

	of co-designing with living organisms, enabling them to formulate concepts and prototypes for do-it-yourself (DIY) machines and tools to cultivate these materials beyond traditional laboratory settings. **Schedule:** **Weeks 1-3: Seeds - knowledge transfer** This unit lays the foundations for this Biodesign project. Students are introduced to a range of bio-based design strategies through a series of knowledge gathering and exploratory laboratory and workshop sessions and lectures, as well as online webinars provided by organisers of the BDC in March and April. Teamed up in groups of 3 to 4 students, they will develop a concept and a strategy how to turn the concept into a prototype. **Weeks 4-10: Plants** Building on the foundation of the "Seeds" unit, the implementation phase starts. Students will work with digital fabrication tools, minicomputers and their chosen biomaterial to develop a prototype machine. In the end of April an interim presentation will take place during which student group will present their process. Based on the fulfilment of the selection criteria (see list below), one team will be selected for presenting their prototype in New York. **Week 11-12: Harvest** Unit 3 deals with the communication of the project, finalising the presentation tools. Selection criteria for the winning team to go to New York: The Selection will be based on the following criteria 1. Concept: how original is the concept (how much innovation potential it has) 2. Impact: how high is the positive impact on the Biodesign and bio-maker community 3. Implementation: is the concept physically implementable 4. Communicaton: how well is the project idea and vision communicated Learning environment: **Classroom (Material library) and BIOLAB, MOME TWO -1**
4. Evaluation	Assessment: The course is completed through active participation in lectures, workshops, individual teamwork, consultations and presentations. Assignments: The development of an open-source tool or machine for the development of bio fabricated materials. Assessment method: Based on class attendance, interim outcome presentation, group work and final process. Assessment criteria: As result of this course is a team project, the grade will be calculated based on the activity and participation of the students, according to their role and responsibility in the project. **Calculation of grade:** Attendance: 30% Group work: 40% Interim presentation: 15% Final presentation: 15%

	Prior learning recognition (based on application): -
	Recommended readings: https://www.biodesignchallenge.org/ Further readings, documents, sources: https://www.biodesignchallenge.org/resources
	Additional information: **The projects are judged based on the following four criteria by BDC judges:** ○ Concept ○ Narrative ○ Reflection ○ Context **There are the following prize categories:** ○ Overall Winner/Grand Prize ○ Runner-Up ○ Outstanding Art ○ Outstanding Exhibit ○ Outstanding Field Research ○ Outstanding High Schoolers ○ Outstanding Narrative ○ Outstanding Science ○ Outstanding Social Critique ○ Outstanding Video ○ Outstanding Instructor **Important Dates:** **Classes:** **March - April***:* BDC 2024 Webinar Series **March 26-27***:* Mid-Challenge Check-ins **May 28, 11PM (CET)**: - Deadline to submit Non-Finalist Student Projects to BDC - Deadline to submit Finalist Team images **June 3, 11PM (CET):** -Deadline to Submit Finalist Team Files (presentation, video files) **Presentation** **June 11-12:** Students to come in for Gallery Exhibition setup **June 12:** Instructor Professional Development Day **June 13-14:** BDC Summit 2024 + Gallery Exhibition in New York **June 15:** Farewell Activities, Instructor Feedback Session
	Schedule and venue for personal consultation: By individual arrangement.