

**BMB 961, Section 001. 3 Credits, Spring 2018**

*Title:* ***Biotechnology for Health and Sustainability***

*Participating Faculty:* Björn Hamberger (instructor), Christoph Benning (instructor), Tom Sharkey (instructor), invited MSU Faculty and External Participants

*Coordinator:* Björn Hamberger ([hamberge@msu.edu](mailto:hamberge@msu.edu))

*Meeting time:* Tuesdays and Thursdays 9-10:20 am

*Location:* Molecular Plant Sciences 1050

*Description:* This course is part of an interdisciplinary effort to foster opportunities for graduate students with interest in biotechnology for applications in health and sustainability. Despite building on cases from plant biotechnology, this course invites students with broad interests, also outside the field of photosynthetic systems, to join. A broad overview of the state-of-the art of plant biotechnology and related fields will be explored. You will be encouraged to think about concepts and ideas that can be potentially commercialized and the different, individual perspectives discussed will shape the overall course. Examples debated will highlight, but are not limited to plant metabolic pathways that impact human health and nutrition, as well as sustainability in the production of therapeutics, food and biomaterials. Case studies will be discussed that cover expression hosts, strategies and pitfalls in transferring and expression of foreign pathways. Examples are chosen to explain in simple terms basic metabolic engineering principles, including synthetic biology approaches to generate, analyze, and optimize transgenic platforms. Some of the chosen cases will be particularly suited to discuss regulatory and commercial issues related to genetically modified organisms (GMOs) and the 'share-your-parts' philosophy, as promoted for example by the international genetically modified machine (iGEM) initiative. To actively participate in the course, you need to have a basic understanding of molecular biology, genomics, or biochemistry, and are expected to read background and original research papers as assigned. Participants will be guided to develop a 3-page brochure presenting a scientific idea for a biotechnology based product or process with a recognized need or a new opportunity. You will need to lay out the idea, present reasonable milestones and be aware of potential technical, commercial, or societal hurdles, and articulate how the proposed technology would address the need or opportunity. Relevant concepts (novel technologies for genome editing, societal acceptance and outreach, IP aspects) will be discussed and a list of topics will be developed during the course together with the students. The instructor(s) will provide

guidance and feedback to you on an individual base as you develop your project, and for both take home assignments. During the final sessions of the semester, everyone will be asked to present their idea/spin-out in a 10-min pitch, followed by feedback from the entire group. This will include, where relevant, involvement of the MSU Innovation Center.

*Prerequisites:* Interest in applied biotechnology, basic knowledge in molecular biology, genomics, or biochemistry as demonstrated by having completed at least one of the following graduate level classes: BMB801 molecular genetics, BMB961 genomics, BMB864 plant biochemistry, BMB865 plant molecular biology.

*Limitation:* 15 Students

*Evaluation of progress and grading:*

1. Brochure, 3 pages (25% of grade)
2. Final presentation (25% of grade)
3. 1<sup>st</sup> Midterm exam, on first half of topics, take home assignment 24 hours (25% of grade)
4. 2<sup>nd</sup> Midterm exam during finals week on second half of topics, take home assignment 24 hours (25% of grade)

*Location:* 1050 Molecular Plant Sciences Building (MPS)