

BMB 961, Section 001. 3 Credits, Spring 2017

Title: *Plant 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)

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

Location: Molecular Plant Sciences 1030

Description: This course is part of an interdisciplinary effort to foster opportunities for graduate students with interest in plant biotechnology. A broad overview of the state-of-the art of plant biotechnology and related fields will be provided. In addition, students are encouraged to think about concepts and ideas that can be potentially commercialized. Special emphasis will be on plant metabolic pathways that impact human health and nutrition, as well as sustainability in the production of therapeutics, food and fuels from plants and algae. Examples and case studies will be discussed that cover hosts, strategies and pitfalls in 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 plants or algae. 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, students need to have a basic understanding of molecular biology, genomics, or plant biochemistry, and are expected to read background and original research papers as assigned. Students will be guided to develop a 3-page brochure presenting a scientific idea for a plant biotechnology based product or process with a recognized need or new opportunity. The students 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 first three weeks of the course together with the students. The instructor(s) will provide guidance and feedback to the students on an individual base as they develop their project. During the final sessions of the semester, students will be asked

to pitch their idea in a 10 min presentation, followed by feedback from the entire group.

Prerequisites: Basic knowledge in molecular biology, genomics, or plant 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. 1st Midterm exam, on first half of topics, take home assignment 24 hours (25% of grade)
4. 2nd Midterm exam during finals week on second half of topics, take home assignment 24 hours (25% of grade)

Location: 1030 Molecular Plant Sciences Building (MPS)