

The University Senate of Michigan Technological University

PROPOSAL 13-19 (Voting Units: Academic)

“Proposal for Minor in Sustainable Biomaterials”

School of Forest Resources and Environmental Science

Contact: Mark Rudnicki

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1. Introduction

Bio-based materials are the future. Knowledge of how they are produced, transported, manufactured, recycled and returned to ecosystems is fundamental to the circular bioeconomy. The vision of the bioeconomy is centered on the application of research, development, innovation and industrial biotechnology to produce and utilize renewable materials and energy. There are exciting new growth opportunities in emerging bio-based sectors, that cross over into mobility, plastics, medical biotechnology, and mid-rise construction.

2. Rationale

With over 20 million acres of forest (ranked 5th for timberland in the nation), the state of Michigan also has a large industrial base (auto, plastics, office furniture, biomedical) capable of transitioning to bio-based materials for many of their products. What is needed are technically trained people who are aware of this opportunity and up for the challenge to make it a reality. As Michigan Tech is a technically oriented institution with strong ties to industry through engineering, forestry and business, it is an ideal university to prepare students for this exciting future. This minor will serve to expose students from across the university to the emerging bioeconomy. It is flexible enough to include technical requirements needed by some academic units, while giving all students insight into how the bioeconomy is emerging, and how they can contribute to a sustainable future within their own disciplines, and realize the opportunities in interdisciplinary areas of study and work.

3. Details of Catalog Copy

3.1 Title of Minor

Sustainable Biomaterials

3.2 Catalog Description

Following completion of this minor, offered by the School of Forest Resources and Environmental Science, students will have a greater understanding of sustainable biomaterials and their context within the circular bioeconomy. Students can also learn how their own discipline relates to the utilization of sustainable biomaterials so they may contribute to the creation of a sustainable future.

3.3 List of Courses

The minor requires a total of 18 credits.

Required Course (6 credits)	Prerequisites
FW 3097 Forest Biomaterials (3)	-
ENG 4510 Sustainable Futures I (3)	-
Core Elective (Choose at least one course)	
CEE 4233 Structural Timber Design (3)	CE 3202 or CEE 3202
EC 4640 Natural Resources Economics (3)	(EC 2001 or EC 3002 or FW 4080) and UN 1015 and (UN 1025 or Modern Language - 3000 level or higher)
FW 1035 Wood Anatomy and Properties (4)	-
SS 3313 Sustainability Science, Policy, and Assessment (3)	UN 1015 and (UN 1025 or Modern Language - 3000 level or higher)
Electives (Choose up to 9 credits, depending on the chosen core elective(s))	
CEE 4233 Structural Timber Design (3)	CE 3202 or CEE 3202
CEE 4506 Application of Sustainability Principles to Engineering Practice (3)	ENVE 3501 or ENVE 3503 or CEE 3501 or CEE 3503
CEE 4993 Engineering with Developing Communities (2)	(ENG 2120 or MEEM 2150) and (CE 3620 or CEE 3620)
CH 3540 Biophysical Chemistry (3)	BL 1020 or BL 1040) and CH 1122 or (CH 1160 and CH 1161) and MA 2160 and PH 2200
CH 3541 Biophysical Chemistry Laboratory (2)	CH 3540
CH/CM 4610 Introduction to Polymer Science (3)	CH 1122 or (CH 1160 and CH 1161)
CM 3979 Alternative Energy Technologies and Processes (1)	CH 1112 or (CH 1150 and CH 1151) and (MA 1160 or MA 1161)
CM 4080 Undergraduate Research in Biofuels Engineering (1-3)	-
CMG 3250 Structural Analysis and Design (3)	CMG 2120 or MET 2120
CMG 4800 Sustainable Construction (3)	Must have Junior or Senior standing
EC 4620/GE 4620 Energy Economics (3)	EC 2001 and UN 1015 and (UN 1025 or Modern Language - 3000 level or higher)
EC 4640 Natural Resource Economics (3)	(EC 2001 or EC 3002 or FW 4080) and UN 1015 and (UN 1025 or Modern Language - 3000 level or higher)
EC 4650 Environmental Economics (3)	EC 2001 or EC 3002) and UN 1015 and (UN 1025 or Modern Language - 3000 level or higher)
ENG 3505 Modeling Laboratory for Sustainable Systems (1)	ENG 1505 and ENG 2505 and ENG 4510(C)
ENG 4505 Systems Analysis, Modeling, and Design (3)	ENG 3505 and ENG 4510
ENG 4510 Sustainable Futures I (3)	May not be Freshman or Sophomore
FA 2190 Art and Nature (3)	-
FW 3010 Practice of Silviculture (4)	FW 2010 and FW 2051
FW 3098 Adding Value to Biomaterials (2)	-
FW 3110 Natural Resource Policy (3)	-
FW 3116 Ethnobotany (3)	UN 1015 and (UN 1025 or Modern Language – 3000 or higher)
FW 3150 Timber Harvesting (2)	FW 2051
FW 3765 Maple Syrup Management and Culture (1)	UN 1015 and (UN 1025 or Modern Language – 3000 or higher)
FW 4080 Forest Economics & Finance (3)	-
MSE 4777 Distributed Additive Manufacturing Open-Source 3-D printing (3)	Must be enrolled in one of the following College(s): College of Engineering; Must be enrolled in one of the following Class(es): Junior, Senior
SS 3300 Environmental Problems	UN 1015 and (UN 1025 or Modern Language – 3000 or higher)
SS 3630 Environmental Policy and Politics (3)	UN 1015 and (UN 1025 or Modern Language - 3000 level or higher)
SS 4390 Seminar in Sustainability Issues (3)	UN 1015 and (UN 1025 or Modern Language – 3000 or higher)

4. Prerequisites not listed in the Minor:

5. **New course descriptions:** 1 new course - FW 3097 – Forest Biomaterials (proposed fall 2018 as part of the curriculum proposal, aka binder, process)

6. **Estimated costs:** No additional costs are expected.

7. **Planned implementation date :** Fall 2019