THE OHIO STATE UNIVERSITY

College of Engineering

Undergraduate Education & Student Services

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Memo

To: Randy Smith, Vice Provost for Academic Programs, Office of Academic Affairs

From: Rosie Quinzon-Bonello, Assistant Dean for Curriculum and Assessment

Date: December 11, 2019

Re: Program Change Proposal: Bachelor of Science in Materials Science and Engineering

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Attached is a curriculum change proposal submitted by the Department of Materials Science and Engineering. No new courses have been proposed, and there is no increase in the overall number of credit hours required for the major. However, there is a shift in course placement, which results in a one course reduction (3 hours) in the core curriculum, and an addition of 3 hours to the technical elective requirement. A transition plan has been provided.

The College of Engineering Committee of Academic Affairs unanimously approved the proposal during its November 21 meeting.

Yours sincerely,
Rosie Quinzon-Bonello

THE OHIO STATE UNIVERSITY

College of Engineering
Department of Materials Science and Engineering

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Date: Oct 24, 2019

Randy Smith, Vice Provost for Academic Programs Office of
Academic Affairs

Re: Proposed curriculum changes for the B.S. in Materials Science and Engineering

Dear Randy,

The Faculty of the Department of Materials Science Engineering and Welding (DMSE) would like to request curriculum changes for the Bachelor of Materials Science and Engineering. We propose to move one class, MATSCEN 4321 from being a required core course for the major to the status of a technical elective. The class, MATSCEN 4321 would still be offered, but it would have the status of an MSE Technical elective. The change would be credit neutral for the degree overall, but would drop the MSE core class requirements by 3 credits, and increase the MSE technical electives from 15 to 18 credits. The total amount of MSE technical content for the students would be unchanged, but the students would have greater flexibility in the choice of specific technical area within the MSE program. The main reason for the change is to allow students who will not be computationally focused to explore other areas of MSE. The students will retain a strong foundation of computation which will include MATSCEN 2321 and 3321, 2 and 3 credits, respectively. Our present curriculum sheet with the proposed changes is included (first with changes noted, and a second time with the changes not highlighted). These changes have been approved by the MSE faculty. I am requesting the approval of the proposed changes by the Council on Academic Affairs. Thank you in advance for your consideration. Please let me know if you have questions regarding the proposed curriculum changes.

Rationale for the change: In an earlier curriculum revamping, MSE added a strong computational component to its core curriculum. This change included the addition of two 3-credit hour and one 2-credit hour classes on modelling and simulation, MATSCEN 2321, 3321, and 4321, to be taken in the Sophomore, Junior, and Senior year, respectively. The students learn basic principles and obtain facility with relevant modelling programs in MATSCEN 2321, and expand and deepen this understanding in 3321 and 4321. MATSCEN 4321 focusses on more fundamental modelling of materials, and includes computer coding relevant to materials simulations. MATSCEN 4321 is particularly useful for students headed to graduate studies in MSE, but MSE exit surveys have consistently noted that students who are interested in work in industry or those not pursuing graduate work find MATSCEN 4321 less useful. We think that these students will benefit from having the option to take a different MATSCEN course from our list of MSE elective classes, while retaining MATSCEN 4321 as an option if they prefer. The change is also driven by a desire of the instructional faculty to focus on skills required for future computational materials scientists. The instructional mode of MATSCEN 4321 is a project-based course, largely student driven under the mentorship of the instructor and teaching assistants. As the number of MSE students increased it has become increasingly difficult to offer the class in the same manner and the instructional mode has been changed to instructor driven projects. Changes the course to a technical elective will allow the instructors to revert the instructional method. Thus, the change represents an opportunity for students interested in computational materials a focused opportunity to develop critical technical skills in a Materials Specific area of interest under

the guidance of the instructional team. Students who are not interested in pursuing computational science, either in industry or graduate studies, will still receive training in the fundamentals in MATSCEN 2321 and 3321.

Credit hour impact: Overall credit neutral, 3 h less core curriculum, 3h added to MSE technical electives

Classes New/Eliminated: None

Course changes to existing courses: None

Cohort and Transition Plan: We propose that MATSCEN 4321 be taught as a core required class for the last time in Autumn 2019 (presently), and that students who joined the department as Sophomores in the Spring of 2019 (juniors this Autumn 2019), and all students joining the department after that time be treated under these new rules. That would mean that MATSCEN 4321 be offered on a technical elective basis first in the Autumn of 2020 to the students who are juniors this Autumn 2019.

We believe that these changes will retain the rigor of the MSE BS degree, but will allow the students more options within it. Please let me know if you have any questions, my contact information is listed below.

Yours sincerely,

Mike Sumption
Professor, Undergrad Studies Committee Chair
Department of Materials Science and Engineering
College of Engineering
614-688-3684
Sumption.3@osu.edu

B.S. Materials Science and Engineering **2018-2019 Academic Year**

Student Information

Name:_____ OSU Email:_____

Suggested Curriculum

This should be used as a **guide** only. Offerings are subject to change. (**BOLD courses offered only indicated semesters.**)

Year	Autumn	Spring
1	___ ENGR 1100 *(Engineering Survey)* ..... 1 hr ___ ENGR 1181 *(Fundamentals of Engr 1)* ..... 2 hr ___ MATH 1151 *(Calculus 1)* ..... 5 hr ___ PHYSICS 1250 *(Mechanics, Thermal, Waves)* ... 5 hr ___ General Education ..... 3 hr	___ ENGR 1182 *(Fundamentals of Engr 2)* ..... 2 hr ___ MATH 1172 *(Engineering Math A)* ..... 5 hr ___ First Chemistry*(See options below) 4-5 hr ___ General Education ..... 3 hr
2	___ MATSCEN 2010 *(Intro to Engr Materials)* ..... 3 hr ___ MATH 2177 *(Ord & Part Diff Eq)* ..... 4 hr ___ PHYSICS 1251 *(E&M, Optics, Modern Phys)* ... 5 hr ___ Second Chemistry*(See options below) ... 4-5 hr	___ **MATSCEN 2241** *(Struc & Characterization)* ... 3 hr ___ **MATSCEN 2331** *(Struc & Char Lab)* ..... 2 hr ___ **MATSCEN 2251** *(Materials & Thermo)* ..... 3 hr ___ **MATSCEN 2321** *(Modeling & Sim 1)* ..... 3 hr ___ General Education ..... 3 hr ___ General Education ..... 3 hr
3	___ MECHENG 2040 *(Statics & Mechanics)* ..... 4 hr ___ **MATSCEN 3141** *(Struc Transformations)* ..... 3 hr ___ **MATSCEN 3151** *(Transport & Kinetics)* ..... 3 hr ___ **MATSCEN 3331** *(Materials Lab 1)* ..... 2 hr ___ Technical Elective *(see TE notes)* ..... 3 hr ___ General Education ..... 3 hr	___ **MATSCEN 3261** *(Mechanical Behav of Mats)* .. 3 hr ___ **MATSCEN 3271** *(Electronic Materials)* ..... 3 hr ___ **MATSCEN 3321** *(Modeling & Sim 2)* ..... 2 hr ___ **MATSCEN 3332** *(Materials Lab 2)* ..... 2 hr ___ Technical Elective *(see TE notes)* ..... 3 hr ___ General Education ..... 3 hr
4	___ **MATSCEN 4181** *(Materials Selection)* ..... 2 hr ___ **MATSCEN 4321** *(Modeling & Sim 3)* ..... 3 hr ___ MATSCEN 4381 *(Senior Design 1)* ..... 3 hr ___ MATSCEN Elective ..... 3 hr ___ MATSCEN Elective ..... 3 hr ___ **MATSCEN Elective Lab** ..... 1 hr	___ MATSCEN 4382 *(Senior Design 2)* ..... 3 hr ___ MATSCEN Elective ..... 3 hr ___ MATSCEN Elective ..... 3 hr ___ General Education ..... 3 hr ___ General Education ..... 3 hr

Total Hours to complete the degree program = 127

*Students can fulfill chemistry requirements with either Chem 1250+2310 (8 hours) or Chem 1210+1220 (10 hrs) or 1250+1220 (9 hours). **Please consult with academic advisor.**

Program Options

MATSCEN Elective Lab, MATSCEN Electives, and Technical Electives are chosen based on student's interest and focus area in Materials. Generally, these can be: Biomaterials, Ceramics, Electronic Materials, Metallurgy, or Polymers.

Acceptance Criteria

Admission to the major program requires a formal application and is based on a student's cumulative point-hour ratio (CPHR), eligibility point-hour ratio (EPHR), and additional admission to major courses.

EPHR courses: MATH 1151, 1172; ENGR 1181, 1182; CHEM 1250 or 1210; PHYSICS 1250; MATSCEN 2010; or course equivalents. Additional admission to major courses not included in EPHR calculation: ENGLISH 1110.

Applications are accepted during autumn and spring terms. **Admitted students will begin major courses in spring term, regardless of the term in which they are admitted.**

MATSCEN and Technical Electives (TE)

Eighteen credit hours of electives are required, with **at least 12 credit hours coming from MATSCEN courses numbered 5000 or higher.** One MASTCEN 5000-level lab is also required. The remaining **six credit hours of TE** may be any graded course in Engineering, Math, Biological, or Physical Sciences numbered 3000 or higher. Exceptions and recommendations: for Electronic Materials, ECE 2300 *(Electrical Cir and Elect Devices)*; for Biomaterials and Polymers, Chem 2310 or 2510 *(Organic Chemistry)*, if not already used as core chemistry requirement; for Biomaterials only, BIOLOGY 1113 *(Biological Sci – Energy Transfer and Development)* or BIOLOGY 2100 *(Biological Analysis)*.

General Education Requirement

Writing and Communication

English 1110.xx 3 hr

Second Writing Course 3 hr

Social Science

Must choose each course from a distinct subgroup of this category.

3 hr

3 hr

Literature

3 hr

Visual and Performing Arts

3 hr

Historical Study

3 hr

Second Historical Study or Cultures and Ideas

3 hr

Social Diversity in the U.S. or Global Diversity

Some courses may overlap with another GE category, See course list.

0 / 3 hr

Ethics

Some courses may overlap with another GE category, See course list.

0 / 3 hr

Optional: Foreign Language

Foreign Language 1103 Course: credit (including EM) for a foreign language sequence through 1103, or credit for a foreign language course with a prerequisite of 1103, can be used to satisfy the Cultures & Ideas Gen Ed category.

Foreign Language Minor Courses: completion of a foreign language minor permits a student to overlap up to 6 credit hours between the Gen Ed and minor. A curricular petition must be submitted to the student's program, which will forward it to the college for review. The courses must meet the spirit of the Gen Ed category for which overlap is requested.

Optional: University Capstone

Completion of a Social Science 3597 or 4597 can be substituted for a Social Science general education course in any subgroup. Completion of an Arts & Humanities 3597 or 4597 can be substituted for a Visual/Performing Arts general education course.

See the list of approved general education courses for additional details: www.advising.engineering.osu.edu

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Applications are accepted during autumn and spring terms. **Admitted students will begin major courses in spring term, regardless of the term in which they are admitted.**

MATSCEN and Technical Electives (TE)

Twenty-one credit hours of electives are required, with **at least 15 credit hours coming from MATSCEN courses numbered 5000 or higher.** One MATSCEN 5000-level lab is also required. The remaining **six credit hours of TE** may be any graded course in Engineering, Math, Biological, or Physical Sciences numbered 3000 or higher. Exceptions and recommendations: for Electronic Materials, ECE 2300 *(Electrical Cir and Elect Devices)*; for Biomaterials and Polymers, Chem 2310 or 2510 *(Organic Chemistry)*, if not already used as core chemistry requirement; for Biomaterials only, BIOLOGY 1113 *(Biological Sci – Energy Transfer and Development)* or BIOLOGY 2100 *(Biological Analysis)*.

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