Office of the Registrar
PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF A GRADUATE COURSE
(50000-60000 LEVEL)

Graduate Council Doc. No. 15-3
MSE 53700
Spring 2016
2016 20

DEPARTMENT: Materials Engineering
EFFECTIVE SESSION:

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

☐ 1. New course with supporting documents (complete proposal form)
☐ 2. Add existing course offered at another campus
☐ 3. Expansion of a course
☐ 4. Change in course number
☐ 5. Change in course title
☐ 6. Change in course credit/type

PROPOSED:
Subject Abbreviation: MSE
Course Number: 53700
Long Title: Introduction to Biomaterials
Short Title: Biomaterials

EXISTING:
Subject Abbreviation: MSE
Course Number: 599PM

TERMS OFFERED:
☐ Fall
☒ Spring
☐ Summer

CAMPUS(ES) INVOLVED:
☒ Calumet
☐ Cent Ed
☐ Ft. Wayne
☑ Tech Statewide
☐ Indianapolis
☐ W. Lafayette

Abbreviated title will be entered by the Office of the Registrar if omitted. (33 characters only)

CREDIT TYPE
1. Fixed Credit: Cr. Hrs.
☐ 2. Variable Credit Range:
Minimum Cr. Hrs.☐
☐ Maximum Cr. Hrs.
☐ 3. Equivalent Credit: Yes ☐ No ☐
☐ 4. Thesis Credit: Yes ☐ No ☐

SCHOLARSHIP TYPE
☐ Lecture
☐ Recitation
☐ Presentation
☐ Laboratory
☐ Studio
☐ Distance
☐ Clinic
☐ Experiential
☐ Research
☐ Ind. Study
☐ Pract/Observe

MEETINGS PER WEEK
Minutes Per Week
Meetings Per Week

WEEKS OFFERED ☐ 15
% OF CREDIT ALLOCATED 100

COURSE ATTRIBUTES:
1. Pass/Not Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
4. Credit by Examination
5. Special Fees
6. Registration Approval Type ☐ Department Instructor ☒
7. Variable Title ☐ Honors ☒
8. Full Time Privilege ☐
10. Off Campus Experience ☐

CROSS-LISTED COURSES

RECEIVED
SEP 18 2015

OFFICE OF THE REGISTRAR

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
This course aims to introduce students to Biomaterials concepts: structure, properties, and applications. The class will cover the main classes of materials: metals, ceramics and polymers in the context of their use in medicine as implant materials, drug delivery vehicles, and as tissue engineering scaffolds.

Prerequisites: Junior standing in Engineering or Science. Professor Stanciu.

COURSE LEARNING OUTCOMES: See attached document.

Calumet Department Head
Date
Calumet School Dean
Date
Calumet Undergrad Curriculum Committee
Date

Fort Wayne Department Head
Date
Fort Wayne School Dean
Date
Fort Wayne Chancellor
Date

Undergrad Curriculum Committee
Date

North Central Department Head
Date
North Central School Dean
Date
Undergrad Curriculum Committee
Date

West Lafayette Department Head
Date
Graduate Dean
Date
Graduate Dean
Date

APPROVED 9/17/15

Graduate Area Committee Convener
Date

Office of the Registrar

9/18/15
TO: The Faculty of the College of Engineering

From: School of Materials Engineering

RE: Change in Course Number – MSE 52700 Introduction to Biomaterials

The faculty of the School of Materials Engineering has approved the following change in course number. This action is now submitted to the Engineering Faculty with a recommendation for approval.

MSE 52700  Introduction to Biomaterials
Sem. 2, Cr. 3
Prerequisites: Junior or higher standing in Engineering or Science

Description: This course aims to introduce students to Biomaterials concepts: structure, properties, and applications. The class will cover the main classes of materials: metals, ceramics and polymers in the context of their use in medicine as implant materials, drug delivery vehicles, and as tissue engineering scaffolds.

Reason: This class has now been offered seven times as MSE 59700, each Spring Semester 2007-2014, with enrollments starting at around 10 students and increasing up to 60 students from different Schools (Materials Engineering, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Civil Engineering). The primary purpose of this course is to develop an foundation of knowledge of biomaterials science principles. The course presents a balanced view of Biomaterials in Medicine by including information on hard and soft tissues, orthopedic ideas, cardiovascular concepts, as well as how metals, ceramics and polymers are currently used in prosthetics, drug delivery and tissue engineering. Thus, the class is providing students with a starting point towards understanding how Materials Engineering can be applied in a new way that encourages thinking towards solving of societal health challenges.

Approved for the faculty of the Schools of Engineering by the Engineering Curriculum Committee

ECO Minutes 10
Chairman ECO

Date 2-9-15
Supporting Documentation for New Graduate Course

Engineering Faculty Document 19-15
MSE 52700 – Introduction to Biomaterials

A. Justification of the Course

This introductory Biomaterials course has been taught in MSE (for three years cross-listed in BME) since 2008, and is very popular with students. The class provides a completely different perspective than the traditional MSE curriculum, on less known applications in Medicine of the main classes of materials. The course is presenting concepts related to how metallic materials and ceramics are used in applications such as total hip implants, and how polymeric materials are interesting for drug delivery of anti-cancer drugs. In addition, this course is introducing students to the concepts of biocompatibility, toxicity, and the complement cascade, which are concepts related to how the human body is responding to the presence of biomaterials.

This is requested at the 500 level, due to it being a historically non-traditional learning route for students in MSE. The course attracts both undergraduate and graduate students. Although is a course that attracts upper division undergraduate students in majority, it is requested at the 500 level since it is perceived as the next level towards an understanding of Materials Science from a different perspective than the one traditionally taught in the School Curriculum.

B. Learning Outcomes and Method of Evaluation or Assessment

The objective of the course is for the students to become familiar with the main concepts of Biomaterials principles: biocompatibility, structure-property-applications relationships, mechanical response of natural tissues, cellular pathways for tissue-material ingrowth. At the end of the course, all students should understand: what are the requirements for metals and alloys, as well as ceramic materials to be used in load bearing implants (corrosion concepts, stress shielding, mechanical properties, composition), what properties of polymers impact their use in medicine (leaching and swelling, creep and stress relaxation); understand the tissue response to biomaterials: cytotoxicity, carcinogenicity, immune reactions; be able to expand the understanding of materials concepts to drug delivery applications (polymer degradation, encapsulation) and tissue engineering (scaffold porosity, diffusion of nutrients, mechanical properties).

The assessment of student learning outcomes will be performed through three exam throughout the semester, as well as one term paper from recent literature and a student led group presentation on state of the art topics in Biomaterials.

Grading will be performed based on the student performance in the exams, term paper and group presentation. The grading scheme will be: ≥ 90% A; ≥80% B; ≥70% C; ≥50% D; <50% F
C. Prerequisites
   Junior standing in Engineering or Science.

D. Course Instructor
   Lia Staniciu, Associate Professor, School of Materials Engineering. Associate Professor (by courtesy) School of Biomedical Engineering.

E. Course Outline

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<td>Current Topics in Biomaterials Research (tissue engineering, drug delivery etc.)</td>
<td>6%</td>
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F. Reading List
   - Course Notes

G. Library Resources

   Purdue University Engineering Library.
Tests

There will be two tests given over the course of the semester. Their content will be based on lectures and handout material.

Grading

90% = A, 80% = B, 70% = C, 60% = D

Exam 1  30%
Exam 2  30%
Term Paper  20%
Oral presentation  20%

Spring Semester 2009

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Spring 2009 Syllabus
BME58200/MSE 59700-Biomaterials


Instructor: Lia Stanciu
lstanciu@purdue.edu

Teaching Assistant: Aaron Conovaloff
conov@purdue.edu

Office Hours: TBA

Course Goal
This course is designed to provide a foundation of knowledge of biomaterial science principles. The course presents a balanced perspective on the evolving discipline of Biomaterials Science by including information on both hard and soft biomaterials. The course will cover materials science background, fundamental biological concepts, and medical/clinical issues, as well as new trends in biomaterials research. The objective of the class is for the student to gain a solid understanding of what biomaterials are, as well as of the modern trends in biomaterials science and its applications in medicine. At the end of the course, all students should be able to understand the terminology used in biomaterials literature, fundamental properties of biomaterials, be able to correlate terms with processes/phenomena and related events. Examples:

- Performance requirements for metals, ceramics and polymers used as biomaterials.
- Biocompatibility.
- Characterization techniques
- Clotting and Thrombosis
- Foreign body response.

Term Paper
Each student will be required to prepare a research paper in the area of biomaterials based on a chosen subject from the recent literature in biomaterials (journal articles published past five years).

Student Presentations
Students will be required to present their literature research on the subject of their term paper in a 10 minute in-class presentation.
Supporting Document for a New Graduate Course

To: Purdue University Graduate Council
From: Faculty Member: Lia Stanciu
Department: Materials Engineering
Campus: West Lafayette
Date: 08/20/2014
Subject: Proposal for New Graduate Course—Documentation Required by the Graduate Council to Accompany Registrar's Form 40G

Contact for information if questions arise:
Name: Lia Stanciu
Phone Number: 7654096367
E-mail: lstanciu@purdue.edu
Campus Address: ARMS 2223

Course Subject Abbreviation and Number: MSE527
Course Title: Introduction to Biomaterials

A. Justification for the Course:

- Provide a complete and detailed explanation of the need for the course (e.g., in the preparation of students, in providing new knowledge/training in one or more topics, in meeting degree requirements, etc.), how the course contributes to existing majors and/or concentrations, and how the course relates to other graduate courses offered by the department, other departments, or interdisciplinary programs.

- Justify the level of the proposed graduate course (50000- or 60000-level) including statements on, but not limited to: (1) the target audience, including the anticipated number of undergraduate and graduate students who will enroll in the course; and (2) the rigor of the course.

B. Learning Outcomes and Method of Evaluation or Assessment:

- Describe the course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.).

- Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.)

- Grading criteria (select from dropdown box); include a statement describing the criteria that will be used to assess students and how the final grade will be determined.

Criteria: Exams and Quizzes
• Identify the method(s) of instruction (select from dropdown box) and describe how the methods promote the likely success of the desired student learning outcomes.

  **Method of Instruction** Lecture

C. Prerequisite(s):

• List prerequisite courses by subject abbreviation, number, and title.

• List other prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence.

D. Course Instructor(s):

• Provide the name, rank, and department/program affiliation of the instructor(s).

• Is the instructor currently a member of the Graduate Faculty?  X Yes  —  No
  (If the answer is no, indicate when it is expected that a request will be submitted.)

E. Course Outline:

• Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory or field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topics courses, include a sample outline of a course that would be offered under the proposed course.

F. Reading List (including course text):

• A primary reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.

• A secondary reading list or bibliography should include material students may use as background information.

G. Library Resources

• Describe the library resources that are currently available or the resources needed to support this proposed course.

H. Example of a Course Syllabus  (While not a necessary component of this supporting document, an example of a course syllabus is available, for information, by clicking on the link below, which goes to the Graduate School’s Policies and Procedures Manual for Administering Graduate Student Programs. See Appendix K.)


(Revised and Approved by the Graduate Council 10/10)
Supporting Documentation for New Graduate Course

Engineering Faculty Document 19-15
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Spring 2009 Syllabus
BME582/MSE 597M-Biomaterials


Instructor: Lia Stanciu
lstanciu@purdue.edu

Teaching Assistant: Aaron Conovaloff
conov@purdue.edu

Office Hours: TBA

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