REQUEST FOR ADDITION OF NEW COURSE

PROPOSED COURSE DESCRIPTION

Rubric & No. | BE 4337  
---|---
Title | Regenerative Medicine  
Short Title (≤ 19 characters) | REGENATIVE MEDICINE  
Semester Hours of Credit | 3  
If combination course type, # hrs. of credit for | Lecture: 3  
Lab/Sem/Rec: ___  
Repeat Credit Max. (if repeatable): | credit hours Graduate Credit? X Yes No  
Credit will not be given for this course and:  
Course Type (Indicate hours in the appropriate course type.) |  
Lecture | 3  
Lab | ___  
Seminar | ___  
Recitation | ___  
Lec/Rec | ___  
Lec/Sem | ___  
Lec/Lab | ___  
Res/Ind | ___  
Clin/Pract | ___  
Intern | ___  
Maximum enrollment per section: (use integer, e.g. 25 not 20-30) | 25  
Grading System: | Letter Grade X Pass/Fail ___ Final Exam: **Yes X No ___  
**(Attach justification if the proposed course will not hold a final exam during examination week.)**

Course Description:

(Concise catalog statement exactly as you wish it to appear in the General Catalog)

4337 Regenerative Medicine (3) Prereq: BIOL 2083 and BE 1252. Will introduce technologies to regenerate tissues and organs utilizing stem cells and engineered biomaterials. Widely utilized and most advanced regenerative engineering technologies will be presented and discussed, including translational and clinical applications of engineered tissues.

BUDGET IMPACT (IF ANSWER TO ANY QUESTION IS "YES", ATTACH EXPLANATION).

If this course is approved, will additional staff be needed? Yes No X  
Will additional space, equipment, special library materials or other major expense be involved? Yes No X  
Academic Affairs Approval: (Date)  

ATTACHMENTS (ATTACH THE FOLLOWING TO YOUR PROPOSAL)

JUSTIFICATION: Justification must explain why this course is needed and how it fits into the curricula. Will the course duplicate other courses? SYLLABUS: Including 14 week outline of the subject matter; titles of text, lab manual, and/or required readings; grading scale and criteria (For 4000-level, specify graduate student grading criteria if requirements differ for graduate and undergraduate students).

APPROVALS

Department Faculty Approval Date | College Faculty Approval Date  
---|---  
6/29/17 | 6/29/17  
Department Chair Signature | College Dean Signature  
Michele A. Massi | John B. Hoag  
Graduate Dean Signature | Chair, FS C&C Committee  
(7/21/17) | (7/15/17)  
College Contact | Academic Affairs Approval (date)  
E-mail |  

INSTRUCTIONS for FORM A
Instructions for Form A: Request for Addition of New Course

Justification:

BE 4337 Regenerative Medicine will be an additional course focused in the biomedical engineering facet of biological engineering. This course is in response to the need from the growing population of Biological Engineering (BE) students pursuing more biomedical focused courses in the BE curriculum. BE 4337 will count towards a Design Elective. This course will not duplicate any other course at LSU, it is similar to BE 4335 Tissue Engineering and BE 4336 Biocompatibility & Surface Modification of Materials.

The overlap between BE 4335, BE 4336, and BE 4337 will be in the background lectures in stem cell, biomaterials, and tissue engineering applications. Especially, where the BE 4335 curriculum focused on individual components of tissue engineering. None of topics covered integration of stem cell biology and advanced tissue engineering technologies. Also, the text book is outdated. BE 4336 heavily emphasizes on material and tissue interactions. The newly developed BE 4337 will include induced pluripotent stem cell technologies, 3D bioprinting, animal models, immunobioengineering and ethical concerns in Regenerative Medicine applications which are not primary subjects of either BE4335 and BE 4336. Estimation of the total overlap between BE 4335, BE 4336 and BE 4337 is around 6-7% (around 3 hours or one week of lectures).

Support from the Biological Science department attached.
This course will be applicable as a Design Elective. Nine (9) credit hours of Design Electives are required per student. Majority of the current BE students have interest in biomedical engineering or medical professions. This course will provide an opportunity for them to focus their design electives towards their biomedical interest. Currently, BE 4335 and BE 4336 are the only tissue based biomedical Design Electives. This course provides the opportunity for a student to fulfill the Design Elective requirement focused on stem cell and tissue regeneration from most recent publications.
BE 4337: Regenerative Medicine
Fall 2018 Syllabus

Class schedule: MWF 8:30 - 9:20am

Text book: Appropriate research and review papers will be provided for each class.

Instructor: Philip Jung (jjung1@lsu.edu)
Office hours: MW 9:30 - 10:00 or by appointment (167 E.B. Doran)

Course description: This course is designed to introduce technologies to regenerate tissues and organs utilizing stem cells and engineered biomaterials. Widely utilized and most advanced regenerative engineering technologies will be presented and discussed. Translational and clinical applications of engineered tissues will be discussed as well.

Course learning objectives: By the end of the course you should be able to do the following:
1. Understand the fundamental principles at the interface of biology and engineering
2. Define the gaps in knowledge in Regenerative Medicine by critically analyzing recent literatures
3. Work in multidisciplinary teams to communicate effectively with peers to prepare a microteaching (15 min + 5 min discussion)

Grading
1. Exams: Midterm 1 (20%), Midterm 2 (20%) and Final (30%)
2. Literature discussion and participation (15%) - one page written critique and summary needs to be submitted before each discussion.
3. Microteaching (5% instructor + 10% peer assessment)
   - Your group will decide a topic and submit a potential title by the 2nd midterm.
   - Each group presents their proposal in the last week of the semester.
4. The final course grade will be determined from the following scale:

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<thead>
<tr>
<th>letter grade</th>
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<td>97-100</td>
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<td>80-82</td>
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<td>93-96</td>
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<td>D-</td>
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<td>87-89</td>
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Student absence from class (PS-22)
Class attendance is the responsibility of the student. The student is expected to attend all classes. A student who finds it necessary to miss class assumes responsibility for making up examinations, obtaining lecture notes, and otherwise compensating for what may have been missed. The course instructor will determine the validity of a student's reason(s) for absences and will assist those students who have valid reasons. Valid reasons for absences include: illness, serious family emergency, special curricular requirements such as judging trips or field trips, court-imposed legal obligations such as subpoenas or jury duty, military obligations, serious weather conditions, religious observances (See the interfaith calendar website (www.interfaithcalendar.org) for an updated calendar of holidays and primary holy days of the various religions) and participation in varsity athletic competitions or university musical events.

The student is responsible for providing reasonable advance notification and appropriate documentation of the reason for the absence. Should the instructor and student disagree over the validity of a reason for an absence, the student has the right to appeal the instructor's decision according to the general appeal procedure in PS-48.

In the following instances, the dean and not the instructor determines the validity of a student's reason for absence:
1. Group excuses for absence (see Operating Procedures) 2. For undergraduate students, a grade of Incomplete (I-grade) due to absences must be authorized by the dean. I-grades for graduate students do not require dean's approval.

Further information on PS-22 is here,
https://sites01.lsu.edu/wp/policiesprocedures/policies-procedures/22/
<table>
<thead>
<tr>
<th><strong>Date</strong></th>
<th><strong>Topics covered (provisional)</strong></th>
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<tbody>
<tr>
<td>Week1</td>
<td>Course introduction</td>
</tr>
<tr>
<td></td>
<td>Introduction to stem cell and regenerative medicine</td>
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<td></td>
<td>Embryonic stem cells (ESCs)</td>
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<td>Week2</td>
<td>Human ESCs in regenerative medicine</td>
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<td>Current status of induced pluripotent stem cells (iPSCs)</td>
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<td>iPSCs (clinical applications)</td>
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<td>Week3</td>
<td>MSCs (latest advances)</td>
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<td>Therapeutic applications of MSCs</td>
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<td>Stem cell bioengineering (PSC)</td>
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<td>Week4</td>
<td>Stem cell bioengineering (MSC)</td>
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<td></td>
<td><strong>Literature discussion (Stem cell and regenerative medicine)</strong></td>
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<td><strong>Review for Midterm 1</strong></td>
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<tr>
<td>Week5</td>
<td><strong>Midterm 1</strong></td>
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<tr>
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<td>Extracellular microenvironments (ECM)</td>
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<td>Extracellular microenvironments (natural biomaterials)</td>
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<td>Week6</td>
<td>Extracellular microenvironments (synthetic biomaterials)</td>
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<td>Extracellular microenvironments (composite biomaterials)</td>
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<td>Organ fabrication via decellularization</td>
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<td>Week7</td>
<td>Tissue fabrication (2D planar and hollow organs)</td>
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<td>Organ fabrication (3D and 4D bioprinting)</td>
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<td><strong>Literature discussion (solid organ fabrication)</strong></td>
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<td>Week8</td>
<td>Vascular tissue engineering (blood-contacting biomaterials)</td>
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<td>Vascular tissue engineering (functional blood vessels)</td>
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<td>Cardiac tissue engineering (approaches)</td>
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<td>Week9</td>
<td>Cardiac tissue engineering (cardiac patches)</td>
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<td>Cardiac tissue engineering (maturation of differentiating cardiomyocytes)</td>
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<td>Use of large animal models and nonhuman primate models (CVTE)</td>
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<tr>
<td>Week10</td>
<td><strong>Literature discussion (cardiovascular tissue engineering)</strong></td>
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<td><strong>Review for Midterm 2</strong></td>
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<td>Week11</td>
<td><strong>Midterm 2</strong></td>
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<td>Engineering cancer microenvironments (introduction)</td>
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<td>Engineering cancer microenvironments (cancer biomaterials)</td>
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<td>Introduction to immunology</td>
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<td>Week12</td>
<td>Immunomodulation by biomaterials</td>
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<td>Immunobioengineering</td>
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<td><strong>Literature discussion (cancer and immunobioengineering)</strong></td>
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<td>Week13</td>
<td>Ethical concerns on regenerative medicine research</td>
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<td>Ethical concerns on stem cell clinical trials</td>
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<td><strong>Microteaching (team project)</strong></td>
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<td>Week14</td>
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<td><strong>Microteaching (team project)</strong></td>
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Review for Final Exam

Description of activities that will be graded:

**Three exams:** Exams will be taken in class on the scheduled dates. Exam content will address conceptual understanding, experimental design and application of knowledge in Regenerative Medicine applications.

**Final exam:** A comprehensive final exam will be taken at the time and date published in the LSU scheduling book.

**Literature discussion and participation:** Pre-selected journal article will be assigned before in-class discussion. A template with a set of questions from the selected paper will be posted. Literature critiques must be returned on due date. Due dates will be listed on the Moodle website. Further instructions can be found on the course Moodle site.

**Micro-teaching (team project):** Team members will select a research topic and submit a title of the team project (due date will be posted on the Moodle website). Each team will be dedicated to develop new approaches for the identified gaps in knowledge in the field of Regenerative Medicine. Each team will teach the subject in class on the last week of the semester over 20 min followed by 5 min Q&A from peer students.

The instructor will provide a grading rubric. 5% grade will come from the instructor and the other 10% grade will come from average points assessed by students.

**Participation:** Literature critiques and micro-teaching rubrics will be used to grade class participation. Each missed literature critique will deduct 5% portion (of total 100%) and there will be no partial credit for late submission. Any missed micro-teaching rubric will deduct 15% portion (of total 100%). For example, if you missed all four literature critiques and any micro-teaching rubric, your maximum final grade will be 65% (letter grade D) assuming you earned full credits from each exam. If documented excuse is provided prior to due date, exemption will be given.

**Class attendance:** Class attendance is mandatory. Since participation (described above) is an important and significant portion of grade, there will be no separate class attendance portion of your final grade.

**Estimated work effort expectations:** LSU’s general policy states that for each credit hour, you (the student) should plan to spend at least two hours working on course related activities outside of class. Since this course is for three credit hours, you should expect to spend a minimum of six hours outside of class each week working on assignments for this course. For more information see: http://catalog.lsu.edu/content.php?catoid=12&navoid=822.
**LSU student code of conduct:** Cheating and plagiarism will not be tolerated. I will report any student suspected of academic misconduct to the Dean of Students, Dr. Mari Fuentes-Martin. It is encouraged to work together on literature discussions and team-projects, but it is NOT allowed to COPY someone's work (or to allow someone to copy yours). Check with the instructor or the Code of Student Conduct (http://students.lsu.edu/saa/students/code) if you have questions on this matter; it is better to find out all the information you need up front (using office hours or after class), vs. asking for forgiveness later. The reporting process would be agonizing for all of us, but I will do it if I have to. **As faculty members of LSU, it is our responsibility to uphold academic integrity, and the reputation of this university. We take this responsibility very seriously.**

**Disabilities:** Louisiana State University is committed to providing reasonable accommodations for all persons with disabilities. The syllabus is available in alternate formats upon request. Any student with a documented disability needing academic adjustments is requested to speak with Disability Services and the instructor, as early in the semester as possible. All discussions will remain confidential. This publication/material is available in alternative formats upon request. Please contact Disability Services in 115 Johnston Hall, 225-578-5919 or www.lsu.edu/disability.

**Academic Success:** The primary ingredients of your academic success are attending class, managing your time efficiently, taking good notes, reading assigned articles and developing good critical thinking and communication abilities. LSU has a number of excellent resources that will assist you in developing these skills. The place to begin is the Center for Academic Success (http://students.lsu.edu/academicsuccess). The CAS offers guidance on what learning strategies are best suited to your talents, tutoring in the basic subjects, and workshops on a variety of topics, from note taking to time management. Communication Across the Curriculum (http://cxc.lsu.edu) assist students in developing the communication skills necessary for academic and professional success. Finally, with respect to professional success, the LSU Career Center (http://students.lsu.edu/careercenter) can assist you in choosing a major and a profession that best suits your talents and passions and help you develop a four-year career plan to ensure success when you graduate from LSU.
Nick,

The proposed course is unlike any of our courses, so Biological Sciences does support creation of the course.

Gregg

Gregg S. Pettis, Ph.D.
Associate Chair for Undergraduate Studies
Department of Biological Sciences
Louisiana State University
101 Life Sciences Bldg.
Baton Rouge, LA, USA  70803

Joe and Gregg,

I am a new Undergraduate Program Coordinator with Dick and we are looking to add a new course, BE 4337 Regenerative Medicine. This course will look into engineering organ systems, the syllabus is attached. This course is being created to meet the demand of the increasing biomedical focused Biological Engineering (BE) students.

I want to first, ask if this course is like/duplicating any courses taught in Biological Sciences. And Second, ask for your support in creating this course.

If you have any questions or concerns please let me know.

Sincerely,

Nick

Nicholas P. Totaro
Instructor

Room 105 E.B. Doran Building
Dear Nick,

Please note my new email address.

I have no objection to your changing the prereq of BE 4303 from Math 2065 to either Math 2065 or Math 2090.

Sincerely,
Charles Delzell
Associate Chair for Instruction
Math

P.S. Based on my experience with submitting Form C's, I think you don't need a paper letter from me; you could, instead, just include the above email (possibly including yours, too) as an extra page of your Form C Word document.

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Hello Charles,

I am a new Instructor in the Biological and Agricultural Engineering department and I am an Undergraduate Program Coordinator apprentice under Dick. Since Mechanical Engineering created a Robotics minor we have seen many BE students pursue it with interest in prosthetic engineering. For the Robotics Minor students are required to take linear algebra, so the BE students are taking MATH 2090 instead of MATH 2065 to get both the differential equations and linear algebra needed.

We are now running into a pre-requisite problem in BE 4303. This is our biomaterials course with a pre-requisite of MATH 2065. The students who took MATH 2090 are needing overrides, since they did not take MATH 2065.

Our faculty have discussed and would like to make MATH 2090 or MATH 2065 be the pre-requisites to BE 4303. I would like to do a Form C to do so. Could you write a letter of support for this Form C?

If you have any questions please don't hesitate to call or email me.

Sincerely,

Nick

Nicholas P. Totaro