**California State University Channel Islands**

# NEW COURSE PROPOSAL

**Courses must be submitted by November 2, 2009, for priority catalog review.**

DATE (*Change if modified and redate file with current date)*) 9/30/09; REV 12.8.09
PROGRAM AREA(S) BIOLOGY

## 1. Course Information. *[Follow accepted catalog format.]*

**Prefix(es)** (Add additional prefixes if cross-listed) **and Course No. BME 501**
**Title: FUNDAMENTALS OF TISSUE ENGINEERING AND BIOMATERIALS Units: 3**
x Prerequisites BIOL 504; PHYS 200 and 201 or BIOL/PHYS 315
Corequisites
Consent of Instructor Required for Enrollment
**Catalog Description** (Do not use any symbols ): **C**overs molecular, cellular, tissue and organ engineering and societal and ethical issues in regenerative medicine. Also considers major types of biomaterials including metallic, ceramic, polymeric, biodegradable, composite, nano- and other replacement materials and techniques and procedures used in biomedical engineering.

**Grading Scheme:**
x A-F Grades
Credit/No Credit
Optional (Student Choice)

**Repeatability:**
Repeatable for a maximum of units
Total Completions Allowed
Multiple Enrollment in Same Semester

**Course Level Information:**
Undergraduate
Post-Baccalaureate/Credential
x Graduate

**Mode of Instruction/Components (***Hours per Unit are defaulted*).

| | Units | Hours per Unit | Benchmark Enrollment | Graded Component | CS & HEGIS # (Filled in by the Dean) |
|---|---|---|---|---|---|
| Lecture | 2 | 1 | 20 | x | |
| Seminar | | 1 | | | |
| Laboratory | 1 | 3 | 20 | x | |
| Activity | | 2 | | | |
| Field Studies | | | | | |
| Indep Study | | | | | |
| Other Blank | | | | | |

Leave the following hours per week areas blank. The hours per week will be filled out for you.
2 hours lecture per week
3 hours laboratory per week

## 2. Course Attributes:

**General Education Categories**: All courses with GE category notations (including deletions) must be submitted to the GE website: http://summit.csuci.edu/geapproval. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

**A (English Language, Communication, Critical Thinking)**
A-1 Oral Communication
A-2 English Writing
A-3 Critical Thinking

**B (Mathematics, Sciences & Technology)**
B-1 Physical Sciences
B-2 Life Sciences – Biology
B-3 Mathematics – Mathematics and Applications
B-4 Computers and Information Technology

**C (Fine Arts, Literature, Languages & Cultures)**
C-1 Art
C-2 Literature Courses
C-3a Language

C-3b Multicultural
**D (Social Perspectives)**
**E (Human Psychological and Physiological Perspectives)**
**UDIGE/INTD Interdisciplinary**
**Meets University Writing Requirement**
**Meets University Language Requirement**

**American Institutions, Title V Section 40404**: Government US Constitution US History
Refer to website, Exec Order 405, for more information: http://senate.csuci.edu/comm/curriculum/resources.htm
**Service Learning Course** (Approval from the Center for Community Engagement must be received before you can request this course attribute).

**3. Justification and Requirements for the Course.** (Make a brief statement to justify the need for the course)

A. Justification: This is a required course for the MS Biotechnology with an Emphasis in Biomedical Engineering program.

B. Degree Requirement:
x Requirement for the Major/Minor
Elective for the Major/Minor
Free Elective

**Note: Submit Program Modification if this course changes your program**.

**4. Learning Objectives.** (*List in numerical order. You may wish to use the following resource in utilizing measurable verbs: http://senate.csuci.edu/comm/curriculum/resources.htm*)

Upon completion of the course, the student will be able to:
Describe tissue engineering principles and applications at molecular, cellular, tissue and organ levels
Idetify the materials used in tissue engineering and other applications
Summarize the reasons for biocompatibility
Describe and compare the differences of various processes of scaffold design and fabrication in tissue engineering
Identify and apply ethical and regulatory standards in tissue engineering and regenerative medicine

**5. Course Content in Outline Form.** *[Be as brief as possible, but use as much space as necessary]*
History of tissue engineering and regenerative medicine
Morphogenesis, generation of tissue in the embryo
Engineering at the genetic, molecular, cellular, tissue and organ levels
Tissue and organ engineering applications and regenerative medicine
Materials used for tissue engineering
The extracellular matrix as a biologic scaffold for tissue engineering
Natural and degradable polymers in tissue engineering applications
Scaffold design and fabrication
Metallic, ceramic, polymer implant materials and tissue response
Biomaterial processing, immunology and biocompatibility
Biomaterial applications
Cell source, stem cells, cell culture and cryobiology
Soft and hard tissue replacement and transplants
Ethical and societal issues in tissue engineering and regenerative medicine
Regulation of tissue engineering

Does this course content overlap with a course offered in your academic program? **Yes** **No** x
If YES, what course(s) and provide a justification of the overlap.

Does this course content overlap a course offered in another academic area? **Yes** **No** x
If YES, what course(s) and provide a justification of the overlap.

Overlapping courses require Chairs' signatures.

**6. Cross-listed Courses (***Please note each prefix in item No. 1)*

**A.** List Cross-listed Courses (Signature of Academic Chair(s) of the other academic area(s) is required).
List each cross-listed prefix for the course:

**B.** Program responsible for staffing: Biology

**7. References.** *[Provide 3 - 5 references]*


- Tissue Engineering, by Clemens van Blitterswijk, Peter Thomsen , Jeffrey Hubbell, Ranieri Cancedda, J.D. de Bruijn, Anders Lindahl, Jerome Sohier, and David F. Williams, Publisher: Academic Press; 1 edition, 2008, ISBN-10: 0123708699
- Principles of Tissue Engineering, by Robert Lanza, Robert Langer, Joseph Vacanti, Publisher: Academic Press; 3 edition, 2007, ISBN-10: 0123706157
- Fundamentals of Tissue Engineering and Regenerative Medicine, by Ulrich Meyer, Thomas Meyer, Jörg Handschel, Hans Peter Wiesmann , Publisher: Springer; 1 edition, 2009, ISBN-10: 3540777547
- Advances In Tissue Engineering, by Julia Polak, Sakis Mantalaris, Sian E Harding, Publisher: Imperial College Press; 1 edition, 2008, ISBN-10: 1848161824
- Biomaterials: The Intersection of Biology and Materials Science by Johnna S. Temenoff and Antonios G. Mikos, Publisher: Prentice Hall; 1 edition, 2008, ISBN-10: 0130097101
- Biomaterials: An Introduction by Joon Park and R.S. Lakes, Publisher: Springer; 3rd edition, 2007, ISBN-10: 0387378790
- Advanced Biomaterials: Fundamentals, Processing, and Applications by Bikramjit Basu, Dhirendra S. Katti and Ashok Kumar, Publisher: Wiley-American Ceramic Society, 2009, ISBN-10: 0470193409


**8. Tenure Track Faculty Qualified to Teach This Course.**

Biology faculty

**9. Requested Effective Date:**
First semester offered: S2011

**10. New Resources Requested. Yes** ☐ **No** x
If YES, list the resources needed.

A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)

B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)

C. Facility/Space/Transportation Needs

D. Lab Fee Requested (please refer to Dean's Office for additional processing) **Yes** ☐ **No** x

E. Other

**11. Will this new course alter any degree, credential, certificate, or minor in your program? Yes** x **No** ☐
If, YES attach a program update or program modification form for all programs affected.
Priority deadline for New Minors and Programs: October 5, 2009 of preceding year.
Priority deadline for Course Proposals and Modifications: November 2, 2009, of preceding year.
Last day to submit forms to be considered during the current academic year: April 15th.

Ching-Hua Wang 10-1-09

Proposer of Course (Type in name. Signatures will be collected after Curriculum approval) Date

# Approval Sheet

**Program/Course:**
If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

| | | |
|---|---|---|
| Program Chair | | |
| | Signature | Date |
| Program Chair | | |
| | Signature | Date |
| Program Chair | | |
| | Signature | Date |
| General Education Chair | | |
| | Signature | Date |
| Center for International Affairs Director | | |
| | Signature | Date |
| Center for Integrative Studies Director | | |
| | Signature | Date |
| Center for Multicultural Engagement Director | | |
| | Signature | Date |
| Center for Civic Engagement Director | | |
| | Signature | Date |
| Curriculum Chair | | |
| | Signature | Date |
| Dean of Faculty | | |
| | Signature | Date |