

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*)

10/29/09; REV 12.15.09

PROGRAM AREA(S)

BIOLOGY

1. Course Information. *[Follow accepted catalog format.]***Prefix(es)** (Add additional prefixes if cross-listed) and **Course No.** BIOL220**Title:** Stem Cell Technology, Applications and Social Impact **Units:** 3

Prerequisites none

Corequisites none

Consent of Instructor Required for Enrollment

Catalog Description (Do not use any symbols): Examines the impact of stem cell technology in our society. Topics include basic concepts of stem cell biology, ethical concerns surrounding stem cell technology both from individual and social points of view, legal aspects of the technology, and an overview of the potential contributions of stem cells to the emerging field of regenerative medicine.

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:

X Undergraduate

Post-Baccalaureate/Credential

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	3	1	60	xx	
Seminar		1			
Laboratory		3			
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.

3 hours lecture per week

hours blank per week

2. Course Attributes:

X **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

X 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: Stem cell technology is a rapidly growing field with a vast potential for applications in regenerative medicine. The recent influx of major funding in stem cell research is a direct indication of the need for training scientists in stem cell sciences. Today, several concepts of stem cells are misunderstood and it is critical that students be informed about the fundamental principles of stem cells, their characteristics, applications and underlying challenges. In addition, the use of stem cells has raised several questions related to social and ethical issues which need to be addressed. The legal implications behind the use of stem cells and the laws governing the utilization of stem cells for both research and clinical applications are subjects of constant debate as well.

B. Degree Requirement: Requirement for the Major/Minor
xx 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:

1. Understand the basic concepts of a cell and its role in development and formation of an embryo;
2. Explain what stem cells are and their potential applications;
3. Describe the techniques involved in creating, maintaining and studying stem cells;
4. Discuss social and ethical issues and impact of stem cell technology;
5. Outline the laws and regulations of stem cell technology;
6. Describe the significance of stem cell technology and application in medicine and public health.

5. Course Content in Outline Form. [Be as brief as possible, but use as much space as necessary]

1. Basic Biological Concepts

- 1.1 What are cells? How do they develop and function to give rise to an embryo?
- 1.2 What are stem cells?
- 1.2 History of SC discovery
- 1.3 Types of stem Cells (SC)
- 1.4 Pluripotency and multipotency
- 1.5 Isolation and culturing of stem cells
- 1.6 General aspects of SC technology

2. Stem Cell Research

- 2.1 Stem cell therapies
- 2.2 Creating stem cells for research; goals of stem cell research
- 2.3 Issues in stem cell research and recipes for success
- 2.4 Risks and benefits associated with SC research

3. Ethical and Personal Issues

- 3.1 Cultural and Religious beliefs and the use of SC
- 3.2 Animal cloning and potential for human cloning
- 3.3 Individual and family issues
- 3.4 "Personalized cells for personalized medicine"

4. The Social Impact of Stem Cells

- 4.1 SC technology and its benefits to society
- 4.2 Potential adverse social repercussions of SC technology.
- 4.3 Cost-benefit of using SC in medical treatments
- 4.4 Types of diseases in which stem cells can be used
- 4.5 Can SC cells solve major health problems worldwide?
- 4.6 SC cells quality of life and impact in life expectancy in developed countries
- 4.7 Socioeconomic status and access to SC-derived treatments

5. Laws and Regulations Governing the Use of Stem Cells

- 5.1 International laws
- 5.2 Federal and state laws in the United States
- 5.3 Regulatory authorities
- 5.4 Institutional Oversight Committees
- 5.5 Regulations for research use
- 5.6 Clinical use and the FDA

6. Regenerative Medicine

- 6.1 World and US vital statistics (mortality and morbidity rates)
- 6.2 Unmet needs in medical transplantation
- 6.3 Potential uses of SC in degenerative illnesses
- 6.4 Aging population and medical care

Does this course content overlap with a course offered in your academic program? **Yes** X **No** ☐

If YES, what course(s) and provide a justification of the overlap.

BIOL/POLS 345 (Science and Public Policy): This upper-division course discusses relationships between science and public policy as well as societal implications of many rapidly advancing areas of scientific research. One of the topics discussed in the first few weeks focuses on stem cells.

Even though there might be some degree of overlapping among these courses, the fact that BIOL 220 is not an upper-division interdisciplinary GE course differentiates it from this courses in terms of the student populations it serves and the GE requirements that students have to fulfill. In addition, BIOL220 will exclusively focus on the stem cell technology and its impacts and not on other areas of scientific research that are discussed in BIOL/POLS345.

Does this course content overlap a course offered in another academic area? **Yes** X **No** ☐

If YES, what course(s) and provide a justification of the overlap.

PHYS 338 (Science and Conscience): This upper-division course focuses on a variety of ethical issues within the broad sciences using case studies primarily. The area of stem cells is just one of the topics' discussed amongst several others. Even though there might be a small degree of overlapping among these courses, the fact that BIOL 220 is not an upper-division interdisciplinary GE course differentiates it from this courses in terms of the student populations it serves and the GE requirements that students have to fulfill.

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:

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

1. Essentials of Stem Cell Biology, 2nd edition, Robert Lanza (editor), Elsevier Academic Press (2009).
2. "Understanding Stem Cells"- publication from the National Academy of Sciences
3. "Stem Cell Basics"- publication from the National Institutes of Health
4. Stem Cell Now (Paperback), Christopher Thomas Scott, Plume (August 29, 2006)

8. Tenure Track Faculty Qualified to Teach This Course.

Biology faculty

9. Requested Effective Date:

First semester offered: Fall/Spring, 2010

10. New Resources Requested. Yes ☐ No ☒

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 ☒

E. Other

☐

11. Will this new course alter any degree, credential, certificate, or minor in your program? Yes ☐ 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**.

Nitika Parmar

102909

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

Date

Request for BIOL 220: Stem Cell Technology, Applications and Social Impact to be added to **GE Category B2: Life Sciences -- Biology**

Committee Response:

Approved by committee on 12-07-2009

Criteria and Justifications Submitted:

- *Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors*
The course will introduce basic scientific concepts related to cell biology and developmental biology as they have been used to identify stem cells and will continue to be used to further our understanding of stem cell technologies. The main focus will be on the development of stem cell technology as well as the current state of research from a scientific point of view – based on the scientific method. A discussion of the fact that stem cell technology is still in its infancy and most potential applications are still in the investigative stage will point to the limitations of scientific endeavors. Limitations of current scientific endeavors include as yet unanswered questions related to biological regulation and control of stem cell development. The key unique education points will include understanding the biology of the cell, origins of stem cells, the potential of stem cells to cause cancer, the requirement for stem cell transplants with clear differentiation trajectories as well as ethical and legal concerns surrounding stem cell applications.
- *Present mathematical or scientific knowledge in a historical perspective and the influences of math and science on the development of world civilizations, both past and present*
The history of stem cell discovery and its potential impact on society will be discussed both from the point of view of development of novel therapies and from the point of view of the ethical dilemmas posed by the discovery. Stem cell identification can be traced back to the 1950s when experiments with bone marrow established the existence of stem cells. Bone marrow transplantation is a widely used therapy today, but since the discovery of the regenerative stem cells at that time, scientists have sought to identify additional regenerative cells. Influences of developing civilizations are significant as medical treatments involving stem cells may someday alleviate specific medical conditions or at a minimum, significantly improve quality of life. Several aspects of stem cell technology have major ramifications for the development of world civilizations – since they impact life as well as our belief systems. Pertinent documentation on Biomedical Ethics (<http://bioethics.stanford.edu/stemcells>) as well as the World religions and their perspectives on stem cells (Pope's publication in '08 Stem Cell issue of Cell Proliferation and/or Dalai Lama's perspective (<http://www.mandalamagazine.org/2003/march/stemcell.asp>) will be discussed in the course.
- *Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas*
One of the major goals of this course is to dispel misconceptions about stem cell technology and present the facts in a logical manner. A discussion of basic embryology and different sources of stem cells will promote a more scientific understanding of the subject and point out many of the fallacies and misconceptions. The course will include information about the precise role of stem cells in the development process and the various types of stem cells that exist along with the tissues from where they can be harvested. Scientific facts will be presented to dispel societal fears that have been associated with stem cell research. The common misconception that only embryonic stem cells are the most optimal for medical uses will be discussed and the potential of non-embryonic stem cells will be actively presented.
- *Present the principles and concepts that form the foundations of living systems*
Developmental biology as well as cell biology and biochemistry form the basis of the discovery of stem

cells and stem cell research. Stem cell growth and differentiation is the basis for the development of higher life forms. A course in Stem Cell science, by definition, presents these principles and concepts and addresses these criteria by definition. Some of the principles that will be discussed will include the organization of cells in animals, the dynamic nature of cells due to the presence of adult stem cells as well as aging related to the diminished activity of regenerative cells.

Approval Sheet

Program/Course: BIOL 220

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