I. ASCRC General Education Form (revised 2/8/13)

Use to propose new general education courses (except writing courses), to change or renew existing gen ed courses and to remove designations for existing gen ed courses.

Note: One-time-only general education designation may be requested for experimental courses (X91-previously X95), granted only for the semester taught. A NEW request must be submitted for the course to receive subsequent general education status.

| Group (submit separate forms if requesting more than one general education group designation) | II. Mathematics | VII: Social Sciences |
| III. Language | VIII: Ethics & Human Values |
| III Exception: Symbolic Systems * | IX: American & European |
| IV: Expressive Arts | X: Indigenous & Global |
| V: Literary & Artistic Studies | XI: Natural Sciences w/ lab ☐ w/out lab ☒ |
| VI: Historical & Cultural Studies | |

*Courses proposed for this designation must be standing requirements of majors that qualify for exceptions to the modern and classical language requirement.

| Dept/Program | Biological Sciences |
| Course Title | Promise and Perils of Stem Cells |
| Prerequisite | |
| Credits | 3 |

II. Endorsement/Approvals

Complete the form and obtain signatures before submitting to Faculty Senate Office

| Please type / print name | Signature | Date |
| Instructor | Ekaterina Voronina |
| Phone / Email | x4254 ekaterina.voronina@umontana.edu |
| Program Chair | Charles Janson |
| Dean | Chris Comer |

III. Type of request

New X One-time Only Renew Change Remove

Reason for Gen Ed inclusion, change or deletion

Description of change

IV. Description and purpose of the general education course: General Education courses must be introductory and foundational within the offering department or within the General Education Group. They must emphasize breadth, context, and connectedness; and relate course content to students’ future lives: See Preamble:

[http://umt.edu/facultysenate/archives/minutes/gened/GE_preamble.aspx](http://umt.edu/facultysenate/archives/minutes/gened/GE_preamble.aspx)
This course will address a complicated biomedical/societal issue: whether and how using stem cells can revolutionize biomedical approaches and how do ethical and political issues affect the adoption of stem cell-based medicine. In the first section, students will learn the principles behind stem cells function, including key concepts of cell and developmental biology and biomedical factors limiting stem cell applications in medicine. The section will cover the multitude of cell and tissue types in the body, specification and function of stem cells, and experimental manipulation of stem cells. In the next section, students will learn about implementation and challenges of widely-accepted stem cell-based therapies (bone marrow transplantation, and skin grafting for burn victims). This unit will cover the risks and costs of established and novel treatments and the promise of new therapeutic interventions. In the final section, Stem Cells and Society, we will discuss the ethical and political concerns of using stem cells for scientific research and clinical therapy. Students will evaluate the strengths and weaknesses of various positions in this debate, and explore how this debate shapes international landscape of stem cell research. We will also explore stem cells from the journalistic perspective - including both evaluating the rigor of journalistic publications concerning stem cell debate, and the stem cell hype in advertising. Additional topics covered in this section include: intellectual property in biomedical research, stem cell clinics and clinical trials, and ethical and regulatory issues of stem cell research. I am cooperating with Writing Center to provide a mentoring session on writing an essay.

V. Criteria: Briefly explain how this course meets the criteria for the group. See: [http://umt.edu/facultysenate/documents/forms/GE_Criteria5-1-08.aspx](http://umt.edu/facultysenate/documents/forms/GE_Criteria5-1-08.aspx)

| The students will participate in learning activities to formulate hypotheses, understand and test hypotheses through case studies and class discussion, and present their conclusions. |
| Students will learn how the scientific approach of cell biology is used to assess the developmental potential of cell types |
| Students will learn how molecular biological approaches are used to influence the developmental cell fate |

VI. Student Learning Goals: Briefly explain how this course will meet the applicable learning goals. See: [http://umt.edu/facultysenate/documents/forms/GE_Criteria5-1-08.aspx](http://umt.edu/facultysenate/documents/forms/GE_Criteria5-1-08.aspx)

| Students will understand the general principles associated with cellular development. |
| Students will understand the methods used in directing and assessing cellular development. |
| Students will learn how to interpret and verify experimental outcomes. |
| Students will acquire an appreciation for ethical, economic, and medical concerns about implementation of stem cell-based treatments. |
**VII. Justification:** Normally, general education courses will not carry pre-requisites, will carry at least 3 credits, and will be numbered at the 100-200 level. If the course has more than one pre-requisite, carries fewer than three credits, or is upper division (numbered above the 200 level), provide rationale for exception(s).

**VIII. Syllabus:** Paste syllabus below or attach and send digital copy with form. The syllabus should clearly describe how the above criteria are satisfied. For assistance on syllabus preparation see: [http://teaching.berkeley.edu/bgd/syllabus.html](http://teaching.berkeley.edu/bgd/syllabus.html)

See attached Syllabus

**Please note:** Approved general education changes will take effect next fall.

General education instructors will be expected to provide sample assessment items and corresponding responses to the Assessment Advisory Committee.
Promise and Perils of Stem Cells

3 credits

Fall 2015 or Spring 2016

Instructor: Dr. Ekaterina Voronina
ISB 217
(406) 243-4254
ekaterina.voronina@umontana.edu

Lectures: TTH, 3:10-4:30 (if fall semester); TTH, 11:10 - 12:30 (if spring semester)

Textbook:

Course Description:
This course will address a complicated biomedical/societal issue: whether and how using stem cells can revolutionize biomedical approaches and how do ethical and political issues affect the adoption of stem cell-based medicine. In the first section, students will learn the principles behind stem cells function, including key concepts of cell and developmental biology and biomedical factors limiting stem cell applications in medicine. The section will cover the multitude of cell and tissue types in the body, specification and function of stem cells, and experimental manipulation of stem cells. In the next section, students will learn about implementation and challenges of widely-accepted stem cell-based therapies (bone marrow transplantation, and skin grafting for burn victims). This unit will cover the risks and costs of established and novel treatments and the promise of new therapeutic interventions. In the final section, Stem Cells and Society, we will discuss the ethical and political concerns of using stem cells for scientific research and clinical therapy. Students will evaluate the strengths and weaknesses of various positions in this debate, and explore how this debate shapes international landscape of stem cell research. We will also explore stem cells from the journalistic perspective - including both evaluating the rigor of journalistic publications concerning stem cell debate, and the stem cell hypes in advertising. Additional topics covered in this section include: intellectual property in biomedical research, stem cell clinics and clinical trials, and ethical and regulatory issues of stem cell research. I am planning to cooperate with Writing Center to provide a mentoring session on writing an essay.

Course Aims:
- Provide a basic background for understanding cellular development concepts, as they relate to stem cell field (cell types, differentiation, regeneration)
- Provide students with a solid understanding of biomedical terminology used in the field of stem cell research. This knowledge will aid students’ preparation for Biology curriculum, and if the students are not on the Biology track, this background will provide them with critical means to evaluate stem cell debate in media, and any treatment opportunities available to them and their families.
- Enable students to participate in the complex ethical debate surrounding the topic of stem cell research.
Learning Outcomes:
• Students will be able to understand what is a stem cell, how is it different from any other cell type, and what general types of stem cells are there.
• Students will be able to evaluate safety concerns behind adoption of stem cell-based therapies
• Students will be able to discuss ethical, political, and economic issues related to stem cell-based applications

Course Format and Grading: This course will utilize a lecture format to present core concepts to the students, supplemented with case studies to practice applying core concepts. Animations and videos will be used to supplement lecture content. We will use discussion of newspaper articles and writing an essay on stem cell issues to practice both evaluating mainstream news media information from a scientific perspective and communicating scientific research to a lay audience.

Exams including multiple-choice and short essay questions will cover the three components based on the three sections of the class:
Exam 1: Stem cell features: cell biology and development
Exam 2: Stem cells biomedical applications: challenges and promise
Exam 3: Essay on global ethical and political implications of using stem cells to cure disease

Grading:
Exam 1 100 pts
Exam 2 100 pts
Exam 3 100 pts
Pre Test 10 pts
Post Test 10 pts
Case Studies 100 pts (=5x20 pts)
Newspaper Article Comments 40 pts (=2x20 pts)
Group Presentation on a Stem Cell Therapy 40 pts

total 500 pts

Week 1
1 Stem cells at a glance. Discovery of stem cells. Is stem cell research necessary?
2 What is a stem cell? Regenerative powers of a stem cell.

Week 2
1 The parts that make a cell. Are there any special components in a stem cell?
2 Stem cell niche and regulation: stem cell’s support system.

Week 3
1 All things a stem cell may become: developmental potency.
2 Stem cells: sources and clinical applications. Different types of stem cells.

Week 4
1 Medical applications of induced pluripotent stem cells: disease modeling
2 Drug discovery and iPS cells: no animal testing any more?
Week 5
1  Key roadblocks for stem cell treatment: immunity, tumorigenicity, failure of engraftment.
2  **Exam 1: Stem cells features: cell biology and development**

Week 6
1  Biomedical application of stem cells: burn therapy; bone marrow transplantation.
2  Laboratory culture of stem cells. What can go wrong in the lab?

Week 7
1  Cancer stem cells.
2  Potential use of stem cells to treat brain and spinal cord injury and disease

Week 8
1  Potential use of stem cells to treat cardiovascular disease and diabetes
2  Stem cell cosmetics: only skin-deep?

Week 9
1  Stem cell as a drug. Working within the research standards framework
2  Protections of Human Subjects

Week 10
1  **Exam 2: Stem cells biomedical applications: challenges and promise**
2  Religion, Politics and International Debate

Week 11:
1  Law and stem cells
2  Intellectual property in biomedical research  
   Joe Fanguy (Technology Transfer Office)

Week 12
1  Dilemmas of stem cell reporting  
   Joe Eaton (School of Journalism)
2  Stem cells for profit: ethical approaches

Week 13
1  Essay on stem cell issue  
   Writing Center
2  Can the stem cell debate be resolved? Key people and advocacy groups

Week 14
1  Student-led Discussion - Global Issues
2  Review

**Exam 3: Ethical and political implications of using stem cells to cure disease**