INBIO-300-01 STEM CELLS AND REGENERATION
COURSE SYLLABUS

Monday & Wednesday, 12:00PM – 1:45PM, Science Center 351

Instructor:
Dr. Jason Pellettieri
Science Center 335
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603-358-2380

Office Hours:
Tuesday, 12:00PM - 1:00PM
Wednesday, 11:00AM - 12:00PM
Thursday, 12:00PM - 1:00PM
or by appointment

Course Description:

Advances in biomedical research have raised the prospect of using stem cells to regenerate lost or damaged body parts. This course will explore the biology of this field and associated ethical and political issues. A laboratory project will introduce the scientific method and the amazing regenerative ability of planarian flatworms.

Integrative Studies Program:

This course is part of the Integrative Studies Program (ISP), Keene State College's liberal arts program. Upon completion of the ISP curriculum, students are expected to be aware of the various forms of knowledge in the liberal arts and to have developed intellectual skills important for not only academic, but also lifelong learning. Please note that your work may be randomly selected for review for the purposes of assessing the effectiveness of the Integrative Studies Program. Your work will be reviewed only by faculty responsible for ISP assessment and your confidentiality will be maintained. Further information on submitting assignments for ISP assessment will be provided in class as necessary.

ISP Objectives for This Course:

In successfully completing this course, students are expected to gain an understanding of basic scientific concepts in the field as well as their ethical and political implications. Students are also expected to improve their critical thinking and communication skills. Specific student learning outcomes are outlined below:

Natural Science Learning Outcomes – Students Will be Able to Demonstrate:

- Familiarity with the scientific method and its application to biomedical research
- Knowledge of naturally occurring regenerative processes in humans and lab animals
- Knowledge of fundamental processes of human embryonic development
- Knowledge of stem cells and how they are cultured in the laboratory
- Understanding of how stem cells might be used in the treatment of human disease

Integrative Learning Outcomes – Students Will be Able to Demonstrate:

- Understanding of ethical controversies surrounding embryonic stem cell research
- Awareness of possible societal impacts of research in stem cell biology and regeneration

- Ability to make informed decisions about political issues related to stem cell research
- Awareness of scientific and economic arguments surrounding gene patenting

Skill-Based Learning Outcomes – Students Will be Able to Demonstrate:

- Ability to formulate and test scientific hypotheses
- Ability to analyze and interpret scientific data
- Ability to prepare a written report summarizing scientific data and conclusions
- Ability to articulate a point of view in debates on scientific policy issues
- Ability to make logical arguments supported by results from scientific research
- Ability to create and deliver an effective oral presentation

Students will reach the above outcomes by attending lectures and studying the material presented therein, participating in group discussions, and completing all assignments, including a group laboratory research project.

Course Materials:

The two books listed below will be used throughout the course. They are available for purchase through the College Bookstore and a copy of each has been placed on reserve at the Mason Library. Additionally, short readings will be assigned and posted to Blackboard.

Stem Cell Now: a Brief Introduction to the Coming Medical Revolution
Christopher Thomas Scott

Bioethics and the New Embryology: Springboards for Debate
Scott F. Gilbert, Anna L. Tyler, and Emily J. Zackin

Evaluation and Grading:

Quizzes – 5 @ 20 points each	100 points
Laboratory Project	
Oral Presentation	75 points
Written Report	75 points
Current Research Presentation	75 points
Class Discussions	100 points
Exam	75 points
Total	*500 points*

A 465 and up (93%)	**AB** 440-464 (88%)	**B** 415-439 (83%)	**BC** 390-414 (78%)
C 365-389 (73%)	**CD** 340-364 (68%)	**D** 315-339 (63%)	**F** 0-314 (<63%)

Monitoring Your Performance

Note that your grades will be viewable (password-protected) throughout the semester on Canvas. You are responsible for monitoring your own performance. Please see me during office hours if you have questions/concerns about your grades. Final grades for the course will not be changed after they are entered, except in the event of a grading error.

Quizzes

A total of eight unannounced short quizzes will be administered throughout the semester to provide an incentive for you to come to class and to keep up with assigned coursework and readings. Your three lowest scores will be dropped. All quizzes will begin at the start of class and cannot be made up for any reason, including an excused absence.

Laboratory Project

The laboratory work in this course will involve a group project with aquatic flatworms called planarians. These animals have a remarkable ability to regenerate missing body parts and this ability will be tested under different experimental conditions. Specifically, you will design and carry out your own group experiment, collect and analyze data, and present your findings in a short (10-15 minute) oral presentation and a written report (6-10 double-spaced pages).

The laboratory project is a particularly important part of the course because it will expose you to the process of regeneration, provide you with experience using the scientific method, and promote the development of critical and analytical thinking skills. However, any student wishing not to participate in animal research may elect one of the following alternative arrangements: 1) observe, but do not directly conduct experimental protocols (an intellectual contribution to the project will still be expected); or 2) skip the laboratory project entirely and prepare an oral presentation (10-15 minutes) and written report (20 double-spaced pages with at least 5 references) summarizing recent advances in regenerative medicine.

Current Research Presentation

Each of you will select a recent discovery or breakthrough in the fields of stem cell biology or regeneration and present a brief synopsis of the work to the class. These presentations should include a general overview of what was done, what was concluded, and why the results are important. Further instructions on this assignment will be provided in class.

Class Discussions

All students are expected to contribute to in-class discussions. Merely attending class and voicing an occasional opinion or asking an occasional question does not constitute full participation and will not earn full class discussion points. Please come to class prepared for rigorous discussions and debates of assigned course material. Note that many of the topics in this class are controversial. It is imperative that all students demonstrate respect for viewpoints different than their own and speak courteously to other members of the class. While I hope that we will have lively debates, please be advised that discriminatory comments based upon gender, race, age, religion, sexual orientation, etc. will not be tolerated.

Final Exam

There will be a single exam during final exam week covering lecture and discussion content, as well as assigned readings. You are advised to take careful notes in class and to complete all assigned readings. Please see me during office hours or e-mail me well in advance of the exam if you are having trouble with any material covered in the course.

Course Requirements and Policies:

You are responsible for making sure that you understand and adhere to all of the course requirements and policies outlined below. These policies are not subject to negotiation.

Attendance

Students are expected to attend all classes. Because it is impossible to reschedule the lab project, any student missing more than two lab sessions due to unexcused absences will receive a zero for both lab assignments (a deduction of 150 points, or 30%, from the final course grade). You will also receive a zero for any other coursework (presentations or exam) missed because of an unexcused absence. Although I will not take formal attendance for lectures, regular class attendance is critical to doing well on the quizzes. Please note College policy stipulates that a student who misses in excess of three weeks of classes prior to the eleventh week of the semester (for any reason whatsoever) must withdraw from the course.

Absences due to illness, serious accident, death in the family, or participation in a scheduled athletic event will be excused. Except in unusual circumstances (e.g., a car accident shortly before the start of class), you must notify me of your absence *in advance* for your absence to qualify as excused. Written documentation, such as a physician's note, may also be required. If you are late for class, the policies for excused and unexcused absences outlined above will be applied to the time you miss.

Make-Up Coursework

Except for the quizzes, coursework missed because of an excused absence can be made up if you contact me as soon as possible to make alternative arrangements. The content and/or format of the make-up coursework (particularly for the lab) may differ from that of the original. Any coursework missed because of an unexcused absence *cannot* be made up.

Cell Phone Policy

Please do not use your cell phones or wireless devices during class and lab (with the exception noted below). The first time you violate this policy, you will receive a verbal warning. A second violation will result in dismissal from class. A third violation will result in mandatory withdrawal from the course. I will make an exception to this policy if you have a serious personal issue that requires use of your phone and you notify me prior to the start of class.

Late Assignments

Late assignments will incur a penalty, the amount of which will be determined at my discretion.

Academic Honesty

Please read and make sure you fully understand the College's Policy on Academic Honesty (http://www.keene.edu/administration/policy/detail/academic-honesty). Any incidents of plagiarism, cheating, or other violations of this policy will be reported to the administration.

You should be aware that plagiarism includes both paraphrasing another person's work without providing a citation, as well as directly copying another person's work without putting the copied material in quotation marks (or italicizing extended passages) and providing a citation. The College's Policy on Academic Honesty includes further guidelines on this subject and I will provide additional guidance in class as well.

Course Website and E-mails

You are required to check your KSC e-mail at least once between each class period. You should also visit the course website on Canvas at least once each week. Updates to course content, including changes to instructions for completing assignments, may be e-mailed and posted throughout the semester. PowerPoint slides for lectures will be posted to Canvas, usually prior to the start of class.

Weather Policy

I will notify you of any class cancellations due to inclement weather by campus e-mail. If the College declares curtailed operations, class will automatically be cancelled.

Getting Extra Help:

Being a college student can be a stressful experience. If you need extra assistance with any aspect of this course or in dealing with problems outside of this course, please don't hesitate to ask for help. You can meet with me and/or seek support from the following campus offices:

Student Disabilities

It is College policy to provide reasonable accommodations to students with disabilities. If you would like to request such accommodations, please contact the Office of Disability Services (ODS) located on the first floor of the Elliot Center (phone: 603-358-2353).

Aspire Program

Any student interested in obtaining academic assistance (tutoring, advice on study or time management skills, etc.) should contact the Aspire Program located on the first floor of the Elliot Center (phone: 603-358-2325).

Writing and Math Centers

Students interested in improving their writing or math skills are encouraged to schedule an appointment with a tutor at the Center for Writing at 81 Blake Street (phone**: 603-358-2412) or the Math Center at** 88 Winchester Street (phone: 603-358-2387)**.**

The Hungry Owl

If you are facing challenges securing food, you are encouraged to make use of the free food provided by The Hungry Owl food resource at a variety of locations on campus including the main location behind Randall Hall and at Mason Library. You can follow The Hungry Owl on Twitter (@KSCTheHungryOwl), Instagram (@kschungryowl), or Facebook (@TheHungryOwlKSC) to learn more.

Counseling Center

The Counseling Center offers a full range of mental health services to all students. The Center is located on the third floor of the Elliot Center (phone: 603-358-2437 or call 603-358-2436 to speak with a crisis counselor during non-business hours).

INBIO-300 Schedule
(Subject to Change)

Date	Topic(s)	Reading or Assignment
Wednesday, 1/22	Course Introduction; Lecture: Regeneration in Nature	
Monday, 1/27	Lecture: Introduction to Planarians; Lab: Planarian Regeneration	
Wednesday, 1/29	Lecture: The Scientific Method; Lab: Planarian Regeneration	Science and the Scientific Method (pdf)
Monday, 2/3	Lab: Planarian Regeneration	
Wednesday, 2/5	Lab: Planarian Regeneration	
Monday, 2/10	Lab: Planarian Regeneration	
Wednesday, 2/12	Discussion: Ethics of Animal Research	Bioethics, Ch. 15
Monday, 2/17	Lecture: Human Development	Bioethics, Ch. 1; Stem Cell Now, Ch. 3
Wednesday, 2/19	Discussion: When Does Life Begin?	Bioethics, Ch. 2
Monday, 2/24	Lecture: Cell Division and Genomic Equivalence	Stem Cell Now, Ch. 2
Wednesday, 2/26	Lecture: Differentiation and Regulation of Gene Expression	
Monday, 3/3	Lecture: Embryonic Stem Cells	Stem Cell Now, Ch. 1 & 4
Wednesday, 3/5	Discussion: Ethics of Embryonic Stem Cell Research	Bioethics, Ch. 10; Stem Cell Now, Ch. 8
Monday, 3/10	Lecture: Adult Stem Cells	Stem Cell Now, Ch. 5
Wednesday, 3/12	Lecture: iPS Cells	Bioethics, Ch. 9
Monday, 3/17	No Class: Spring Break	
Wednesday, 3/19	No Class: Spring Break	
Monday, 3/24	Lecture: Regenerative Medicine	Stem Cell Now, Ch. 7
Wednesday, 3/26	Oral Project Presentations (1)	
Monday, 3/31	Oral Project Presentations (2)	
Wednesday, 4/2	Discussion: Regulation of Clinical Trials	Stem Cell Now, Ch. 9
Monday, 4/7	Lecture: Cloning	Bioethics, Ch. 7
Wednesday, 4/9	Discussion: Ethics of Cloning	Bioethics, Ch. 8
Monday, 4/14	Lecture: Genomics, Gene Therapy, and Personalized Genetics	My Genome, My Self (pdf)
Wednesday, 4/16	Discussion: Genetic Engineering	Bioethics, Ch. 12
Monday, 4/21	Discussion: Who Owns Your Genes and Cells?	Written Project Reports
Wednesday, 4/23	Lecture: Aging	The Calorie-Restriction Experiment (pdf)
Monday, 4/28	Discussion: Should We Extend Human Lifespan?	Bioethics, Ch. 11
Wednesday, 4/30	Discussion: What is "Normal" and What is Acceptable to Change?	Bioethics Ch. 13
Monday, 5/5	Reading Day: Exam Review Session	
Wednesday, 5/7	Final Exam (1:00 - 3:00 PM)	