


5160 Methods in Biotechnology: Cell Culture



 Mirella Meyer-Ficca

 Teacher

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 435-797-1685

 ADVS

 by appointment

Meeting Times & Location

Lectures:

- Mondays and Wednesdays 8:30 am -9:20 am
- BTEC 103

Labs:

- Mondays and Wednesdays 2:00 pm -3:50 pm
- BTEC 007-009

Course Description

Methods in Biotechnology: Cell Culture is a lecture and laboratory-based course designed to provide in-depth laboratory experience in **techniques and fundamental knowledge for culturing mammalian cells**. Students will learn maintenance, growing, cytotoxicity testing, cell cloning, embryonic stem cell culture, etc.

Extensive laboratory experience is provided.

Course Objectives

After the completion of this course, students will have a clear understanding of and hands-on experience in:

1. The principles and techniques in culturing animal cells *in vitro*
2. Cell line characterization and quality assurance of a cell culture laboratory
3. The principles and techniques for establishing primary cultures from tissues and organs
4. Applications of animal cell culture techniques in research and industry



Required Textbooks

1. ***Culture of Animal Cells: A Manual of Basic Techniques***, Seventh Edition
Author: Freshney, R. Ian, Publisher: Wiley-Blackwell 2016
ISBN: 978-1-118-87365-6
2. Protocols will be available on Canvas or a copy will be provided in class.
3. Readings and class slides will be available on Canvas.



Laboratory Fees

A laboratory fee of \$90 is required for the course. All laboratory fees will be used for purchasing supplies (cell culture media, plastic ware, chemical reagents, and laboratory consumables) for use in the course.



Research Paper Presentation

Each student will select **a recent article in the area of cell culture technology** from the scientific literature and present the findings to the class at the beginning of the lecture portion of the course. The presentation should take 8 minutes with two minutes for discussion by the class. A list of journals is provided with this syllabus to select from. 6 - 7 Power Point slides should be enough. Emphasis should be placed on the following:

- The objectives of the study – one slide
- The approach – Methodology –one slide
- The results- 2-3 slides
- The conclusions- one slide

A Partial List of Scientific Magazines (feel free to find additional or different scientific journal sources)

- [Science](http://www.sciencemag.org/) [_ \(http://www.sciencemag.org/\)](http://www.sciencemag.org/)
- [Cell](http://www.cell.com/) [_ \(http://www.cell.com/\)](http://www.cell.com/)
- [BioProcessing Journal](http://www.bioprocessingjournal.com/index.php/article-downloads) [_ \(http://www.bioprocessingjournal.com/index.php/article-downloads\)](http://www.bioprocessingjournal.com/index.php/article-downloads)
- [BioProcess International](http://www.bioprocessintl.com/) [_ \(http://www.bioprocessintl.com/\)](http://www.bioprocessintl.com/)
- [In Vitro Cellular & Developmental Biology- Animal](https://link.springer.com/journal/11626) [_ \(https://link.springer.com/journal/11626\)](https://link.springer.com/journal/11626)
- [BioTechniques](https://www.biotechniques.com/) [_ \(https://www.biotechniques.com/\)](https://www.biotechniques.com/): An international Journal of Life Science Methods
- [Trends in Biotechnology](http://www.cell.com/trends/biotechnology/home) [_ \(http://www.cell.com/trends/biotechnology/home\)](http://www.cell.com/trends/biotechnology/home).
- USU Library: Search for more journals
- Note: Find a recent article (preferably not older than 2-3 years. If in doubt, consult instructor)



Laboratory Reports

Laboratory reports are required for the labs during the semester. Reports should be written in a clear and concise manner and should be submitted to the laboratory instructor **Reports should be submitted no later than the Friday 5 pm after the respective weekly labs.** Delays in reports submission will result in deductions in the grade. The laboratory instructor will decide on points deducted for late reports. Reports is to be submitted electronically.

How to write the laboratory report:

*The laboratory report should be written in your own wording using the laboratory protocols in the text book and the handouts as guidelines. It is best to use the following format:

- Title of the experiment
- Introduction
- Materials
- Methods
- Results
- Conclusion
- State the difficulties that you may have faced in performing the protocols if there were any.



Grade Scheme

Grades will be based on attendance, laboratory participation, lab questions, mid--term exams, and a comprehensive final exam.

Attendance, Lab Participation / Presentation	50 points
Laboratory Reports / quizzes / questions	100 points
Mid-term exams (2 x 100 points)	200 points
Final Exam	150 points
Total Points	500 points (= 100 %)

The following grading standards will be used in this class:

Grade	Range
A	100 % to 93.0%
A-	< 93.0 % to 90.0%
B+	< 90.0 % to 87.0%

Grade	Range
B	< 87.0 % to 83.0%
B-	< 83.0 % to 80.0%
C+	< 80.0 % to 77.0%
C	< 77.0 % to 73.0%
C-	< 73.0 % to 70.0%
D+	< 70.0 % to 67.0%
D	< 67.0 % to 60.0%
F	< 60.0 % to 0.0%

IDEA Objectives

1. Gaining factual knowledge (terminology, classifications, methods, trends)
2. Learning fundamental principles, generalizations, or theories
3. Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course



Attendance

More than four absences (excused or unexcused) will result in a full letter grade reduction of course grade.



Canvas Information

Canvas is the where course content, grades, and communication will reside for this course.

- <http://canvas.usu.edu> (<http://canvas.usu.edu/>)
 - Your **username** is your **A#**, and your **password** is your global password (the same one you use for Banner or Aggiemail).
- For [Canvas](http://canvas.usu.edu/) (<http://canvas.usu.edu/>), [Passwords](https://id.usu.edu/Password/Help/#password) (<https://id.usu.edu/Password/Help/#password>), or any other computer-related technical support contact the [IT Service Desk](http://it.usu.edu/) (<http://it.usu.edu/>).
 - 435 797-4357 (797-HELP)
 - 877 878-8325
 - <http://it.usu.edu> (<http://it.usu.edu/>)
 - servicedesk@usu.edu (<mailto:servicedesk@usu.edu>)

University Policies & Procedures

Academic Freedom and Professional Responsibilities

Academic freedom is the right to teach, study, discuss, investigate, discover, create, and publish freely. Academic freedom protects the rights of faculty members in teaching and of students in learning. Freedom in research is fundamental to the advancement of truth. Faculty members are entitled to full freedom in teaching, research, and creative activities, subject to the limitations imposed by professional responsibility. [Faculty Code Policy #403](http://www.usu.edu/hr/files/uploads/Policies/403.pdf) [_ \(http://www.usu.edu/hr/files/uploads/Policies/403.pdf\)](http://www.usu.edu/hr/files/uploads/Policies/403.pdf) further defines academic freedom and professional responsibilities.

Academic Integrity - "The Honor System"

Each student has the right and duty to pursue his or her academic experience free of dishonesty. To enhance the learning environment at Utah State University and to develop student academic integrity, each student agrees to the following Honor Pledge:

"I pledge, on my honor, to conduct myself with the foremost level of academic integrity."

A student who lives by the Honor Pledge is a student who does more than not cheat, falsify, or plagiarize. A student who lives by the Honor Pledge:

- Espouses academic integrity as an underlying and essential principle of the Utah State University community;
- Understands that each act of academic dishonesty devalues every degree that is awarded by this institution; and
- Is a welcomed and valued member of Utah State University.

Academic Dishonesty

The instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined the University's Student Code. Acts of academic dishonesty include but are not limited to:

- **Cheating:** using, attempting to use, or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity. Unauthorized assistance includes:
 - Working in a group when the instructor has designated that the quiz, test, examination, or any other academic exercise or activity be done "individually;"
 - Depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;
 - Substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work;
 - Acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission;
 - Continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity;
 - Submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or engaging in any form of research fraud.

- **Falsification:** altering or fabricating any information or citation in an academic exercise or activity.
- **Plagiarism:** representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.

For additional information go to: [ARTICLE VI. University Regulations Regarding Academic Integrity](https://studentconduct.usu.edu/studentcode/article6) [_\(https://studentconduct.usu.edu/studentcode/article6\)](https://studentconduct.usu.edu/studentcode/article6)

Sexual Harassment/Title IX

Utah State University is committed to creating and maintaining an environment free from acts of sexual misconduct and discrimination and to fostering respect and dignity for all members of the USU community. Title IX and [USU Policy 339](http://www.usu.edu/policies/339) [_\(http://www.usu.edu/policies/339\)](http://www.usu.edu/policies/339) address sexual harassment in the workplace and academic setting.

The university responds promptly upon learning of any form of possible discrimination or sexual misconduct. Any individual may contact USU's [Office of Equity](https://equity.usu.edu/) [_\(https://equity.usu.edu/\)](https://equity.usu.edu/) for available options and resources or clarification. The university has established a complaint procedure to handle all types of discrimination complaints, including sexual harassment ([USU Policy 305](http://www.usu.edu/policies/305/) [_\(http://www.usu.edu/policies/305/\)](http://www.usu.edu/policies/305/)), and has designated the Office of Equity Director/Title IX Coordinator as the official responsible for receiving and investigating complaints of sexual harassment.

Withdrawal Policy and "I" Grade Policy

Students are required to complete all courses for which they are registered by the end of the semester. In some cases, a student may be unable to complete all of the coursework because of extenuating circumstances, but not due to poor performance or to retain financial aid. The term 'extenuating' circumstances includes: (1) incapacitating illness which prevents a student from attending classes for a minimum period of two weeks, (2) a death in the immediate family, (3) financial responsibilities requiring a student to alter a work schedule to secure employment, (4) change in work schedule as required by an employer, or (5) other emergencies deemed appropriate by the instructor.

Students with Disabilities

USU welcomes students with disabilities. If you have, or suspect you may have, a physical, mental health, or learning disability that may require accommodations in this course, please contact the [Disability Resource Center \(DRC\)](http://www.usu.edu/drc/) [_\(http://www.usu.edu/drc/\)](http://www.usu.edu/drc/) as early in the semester as possible (University Inn # 101, (435) 797-2444, drc@usu.edu (<mailto:drc@usu.edu>)). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate

with faculty to provide accommodations.

Diversity Statement

Regardless of intent, careless or ill-informed remarks can be offensive and hurtful to others and detract from the learning climate. If you feel uncomfortable in a classroom due to offensive language or actions by an instructor or student(s) regarding ethnicity, gender, or sexual orientation, contact:

- Division of Student Affairs: <https://studentaffairs.usu.edu> [\(https://studentaffairs.usu.edu/\)](https://studentaffairs.usu.edu/), (435) 797-1712, studentservices@usu.edu (<mailto:studentservices@usu.edu>), TSC 220
- Student Legal Services: <https://ususa.usu.edu/student-association/student-advocacy/legal-services> [\(https://ususa.usu.edu/student-association/student-advocacy/legal-services/\)](https://ususa.usu.edu/student-association/student-advocacy/legal-services/), (435) 797-2912, TSC 326,
- Access and Diversity: <http://accesscenter.usu.edu> [\(http://accesscenter.usu.edu/\)](http://accesscenter.usu.edu/), (435) 797-1728, access@usu.edu (<mailto:access@usu.edu>); TSC 315
- Multicultural Programs: <http://accesscenter.usu.edu/multiculture> [\(http://accesscenter.usu.edu/multiculture/\)](http://accesscenter.usu.edu/multiculture/), (435) 797-1728, TSC 315
- LGBTQA Programs: <http://accesscenter.usu.edu/lgbtqa> [\(http://accesscenter.usu.edu/lgbtqa/\)](http://accesscenter.usu.edu/lgbtqa/), (435) 797-1728, TSC 3145
- Provost's Office Diversity Resources: <https://www.usu.edu/provost/diversity> [\(https://www.usu.edu/provost/diversity/\)](https://www.usu.edu/provost/diversity/), (435) 797-8176

You can learn about your student rights by visiting:

The Code of Policies and Procedures for Students at Utah State

University: <https://studentconduct.usu.edu/studentcode> [\(https://studentconduct.usu.edu/studentcode/\)](https://studentconduct.usu.edu/studentcode/)

Grievance Process

Students who feel they have been unfairly treated may file a grievance through the channels and procedures described in the Student Code: [Article VII](https://studentconduct.usu.edu/studentcode/article7) [\(https://studentconduct.usu.edu/studentcode/article7/\)](https://studentconduct.usu.edu/studentcode/article7/).

Full details for USU Academic Policies and Procedures can be found at:

- [Student Conduct](http://www.usu.edu/studentconduct) [\(http://www.usu.edu/studentconduct\)](http://www.usu.edu/studentconduct/)
- [Student Code](https://studentconduct.usu.edu/studentcode/) [\(https://studentconduct.usu.edu/studentcode/\)](https://studentconduct.usu.edu/studentcode/)
- [Academic Integrity](https://studentconduct.usu.edu/studentcode/article6) [\(https://studentconduct.usu.edu/studentcode/article6\)](https://studentconduct.usu.edu/studentcode/article6/)
- [USU Selected Academic Policies and Procedures](http://www.usu.edu/provost/faculty-life/syllabus.cfm) [\(http://www.usu.edu/provost/faculty-life/syllabus.cfm\)](http://www.usu.edu/provost/faculty-life/syllabus.cfm/)
- [USU Academic Policies and Procedures](http://catalog.usu.edu/content.php?catoid=4&navoid=546) [\(http://catalog.usu.edu/content.php?catoid=4&navoid=546\)](http://catalog.usu.edu/content.php?catoid=4&navoid=546/)

- [Academic Freedom and Professional Responsibility Policy](http://www.usu.edu/hr/files/uploads/Policies/403.pdf) (<http://www.usu.edu/hr/files/uploads/Policies/403.pdf>)







Emergency Procedures

In the case of a drill or real emergency, classes will be notified to evacuate the building by the sound of the fire/emergency alarm system or by a building representative. In the event of a disaster that may interfere with either notification, evacuate as the situation dictates (i.e., in an earthquake when shaking ceases or immediately when a fire is discovered). Turn off computers and take any personal items with you. Elevators should not be used; instead, use the closest stairs.













Syllabus Changes & Updates










This syllabus will be updated and continuously adjusted as needed.

Course Summary:

Date	Details	
Fri Jan 17, 2020	 Lab Report 1 (https://usu.instructure.com/courses/578878/assignments/2838869)	due by 5pm
Fri Jan 24, 2020	 Lab Report 2 (https://usu.instructure.com/courses/578878/assignments/2838874)	due by 5pm
Fri Jan 31, 2020	 Lab Report 3 (https://usu.instructure.com/courses/578878/assignments/2838875)	due by 5pm
Wed Feb 5, 2020	 Exam 1 (https://usu.instructure.com/courses/578878/assignments/2838865)	due by 11:59pm
Fri Feb 7, 2020	 Lab Report 4 (https://usu.instructure.com/courses/578878/assignments/2838876)	due by 5pm
Fri Feb 14, 2020	 Lab Report 5 (https://usu.instructure.com/courses/578878/assignments/2838877)	due by 5pm
Fri Feb 21, 2020	 Lab Report 6 (https://usu.instructure.com/courses/578878/assignments/2838878)	due by 5pm

Date	Details	
Fri Feb 28, 2020	 Lab Report 7 (https://usu.instructure.com/courses/578878/assignments/2838879)	due by 5:59pm
Fri Mar 13, 2020	 Lab Report 8 (https://usu.instructure.com/courses/578878/assignments/2838880)	due by 5pm
Wed Mar 18, 2020	 Cell Culture Lab Discussions (https://usu.instructure.com/calendar?event_id=873084&include_contexts=course_578878)	2:00pm to 4:00pm
Fri Mar 20, 2020	 Lab Report 9 (https://usu.instructure.com/courses/578878/assignments/2838881)	due by 11:59pm
Sun Mar 22, 2020	 Cell Culture Discussions - Week of March 18th (https://usu.instructure.com/courses/578878/assignments/2921789)	due by 11:59pm
Mon Mar 23, 2020	 Exam 2 (Remotely Proctored) (https://usu.instructure.com/courses/578878/assignments/2926300)	due by 11am
	 Unnamed Quiz (Remotely Proctored) (https://usu.instructure.com/courses/578878/assignments/2925218)	due by 11am
	 Cell Culture Discussions (https://usu.instructure.com/calendar?event_id=873089&include_contexts=course_578878)	2:00pm to 4:00pm
	 Exam 2 (https://usu.instructure.com/courses/578878/assignments/2838866)	due by 11:59pm
Wed Mar 25, 2020	 Cell Culture Lab Discussions (https://usu.instructure.com/calendar?event_id=873083&include_contexts=course_578878)	2:00pm to 4:00pm
Fri Mar 27, 2020	 Lab Report 10 (https://usu.instructure.com/courses/578878/assignments/2838870)	due by 5pm
	 Paper Presentation original journal article pdf (https://usu.instructure.com/courses/578878/assignments/2838882)	due by 5pm
Sun Mar 29, 2020	 Cell Culture Discussions - Week of March 23rd (https://usu.instructure.com/courses/578878/assignments/2921791)	due by 11:59pm

Date	Details	
Mon Mar 30, 2020	 Cell Culture Discussions (https://usu.instructure.com/calendar?event_id=873088&include_contexts=course_578878)	2:00pm to 4:00pm
Wed Apr 1, 2020	 Cell Culture Lab Discussions (https://usu.instructure.com/calendar?event_id=873082&include_contexts=course_578878)	2:00pm to 4:00pm
Fri Apr 3, 2020	 Lab Report 11 (https://usu.instructure.com/courses/578878/assignments/2838871)	due by 5:59pm
Sun Apr 5, 2020	 Cell Culture Discussions - Week of March 30th (https://usu.instructure.com/courses/578878/assignments/2921792)	due by 11:59pm
Mon Apr 6, 2020	 Cell Culture Discussions (https://usu.instructure.com/calendar?event_id=873087&include_contexts=course_578878)	2:00pm to 4:00pm
Wed Apr 8, 2020	 Cell Culture Lab Discussions (https://usu.instructure.com/calendar?event_id=873081&include_contexts=course_578878)	2:00pm to 4:00pm
Fri Apr 10, 2020	 Lab Report 12 (https://usu.instructure.com/courses/578878/assignments/2838872)	due by 5pm
	 Paper Presentation pdf file (https://usu.instructure.com/courses/578878/assignments/2838883)	due by 5pm
	 Paper Presentation ppt file (https://usu.instructure.com/courses/578878/assignments/2838884)	due by 5pm
	 Cell Culture Presentations (https://usu.instructure.com/courses/578878/assignments/2924395)	due by 11:59pm
Sun Apr 12, 2020	 Cell Culture Discussions - Week of April 6th (https://usu.instructure.com/courses/578878/assignments/2921793)	due by 11:59pm
Mon Apr 13, 2020	 Cell Culture Discussions (https://usu.instructure.com/calendar?event_id=873086&include_contexts=course_578878)	2:00pm to 4:00pm
Wed Apr 15, 2020		

Date	Details	
	 Cell Culture Lab Discussions (https://usu.instructure.com/calendar?event_id=873080&include_contexts=course_578878)	2:00pm to 4:00pm
Fri Apr 17, 2020	 Lab Report 13 (https://usu.instructure.com/courses/578878/assignments/2838873)	due by 5pm
Mon Apr 20, 2020	 Cell Culture Discussions (https://usu.instructure.com/calendar?event_id=873085&include_contexts=course_578878)	2:00pm to 4:00pm
Thu Apr 23, 2020	 Final Exam (https://usu.instructure.com/courses/578878/assignments/2838867)	due by 7:30am
	 Final Exam (Remotely Proctored) (https://usu.instructure.com/courses/578878/assignments/2949465)	due by 11:59pm
	 IDEA (https://usu.instructure.com/courses/578878/assignments/2838868)	
	 Practice Quiz (Remotely Proctored) (https://usu.instructure.com/courses/578878/assignments/2925204)	
	 Roll Call Attendance (https://usu.instructure.com/courses/578878/assignments/2838885)	
	 Webex Meetings Attendance Assignment (https://usu.instructure.com/courses/578878/assignments/2921752)	