Bio 109: Genetics and Biotechnology in Society
Fullerton College
Jo Wen Wu, Ph.D.

Fall 2017 Course Syllabus (Aug 28-Dec 16), CRN 11502

INSTRUCTOR CONTACT

- Jo Wen Wu, Ph.D., Division of Natural Sciences, Fullerton College, 321 East Chapman Ave, Fullerton, CA 92832-4055.
  Email: jwu@fullcoll.edu. Email contact is preferred and answered each night. Cell phone number will be given during class announcement for urgent messages.
- Voice messages: 714-992-7459.
- Office: 411-11 (first floor, southeast corner of Science building)
- Study Sessions: TBA but most likely Wed 4:45-6:15 pm
- Private Appointments for Mentoring, Grades, Resume, other help: Mon 2:00 – 4:00 pm in 411-11
  - Sign up at http://www.signupgenius.com/go/5080e4eada82ea64-study (or use this QR code)
  - If no one signs up for appointment, you can come in for study session.

COURSE DESCRIPTION

- This introductory survey course will cover the basic concepts of heredity and current advances in biotechnology - such as cloning, recombinant DNA technology, DNA fingerprinting and gene therapy. This course will emphasize the applications, social consequences and ethical implications of biotechnology in medicine and agriculture. 3 lecture semester units. Non-majors course. (Degree Credit) (CSU, UC)

STUDENT LEARNING OUTCOMES

Upon successful completion of BIOL 109, Genetics and Biotechnology in Society, the student will be able to
- Analyze chromosomal and gene inheritance patterns and probabilities, using Punnett squares and pedigree analysis.
- Demonstrate an understanding of the molecular processes of DNA replication, transcription, and translation, and how these processes are managed in cells.
- Explain how biotechnology is used for medicinal biologics, gene therapy, and genetically modified organisms.

COURSE OBJECTIVES

Upon completion of this course, the student will be able to:
- A. Demonstrate an understanding of course topics.
- B. Differentiate between mitotic and meiotic cell cycles
- C. Distinguish between the inheritance patterns of dominant, recessive, sex-linked and polygenic traits.
- D. Predict the probabilities of one- and two- factor crosses
- E. Analyze karyotypes and pedigree charts,
- F. Describe the information flow of DNA to RNA to proteins
- G. Relate gene function to cellular developmental processes
- H. Design the creation of a new agricultural crop or a plan for saving an endangered species.
- I. Diagram the cloning process to create proteins and transgenic organisms
- J. Analyze experiments in molecular biology, transmission genetics, DNA fingerprinting and population genetics.
- K. Research and describe the symptoms, inheritance and treatment of genetic diseases
- L. Discuss ethical implications of genetic technology in society.
- M. Demonstrate an understanding of the experiments involved in the discovery of genetics principles.
- N. Analyze experiments in molecular biology, transmission genetics, DNA fingerprinting and population genetics.
- O. Research and describe the symptoms, inheritance and treatment of genetic diseases.

COURSE EXPECTATIONS

- You need to be able to read the textbook and lecture notes, do basic algebra, use internet, check weekly class emails, send emails with attached files, and post writing on electronic discussion forum.
- Keep a detailed personal calendar, so that you can plan out your study time and deadlines.
- Although the course is somewhat flexible, you must enter the course server and follow the assignment deadlines
- If you do not want to participate in the course, then you should withdraw officially yourself on MyGateway.
ONLINE COURSE OVERVIEW

- This entire class can be taken almost entirely online and from your home (but you are required to take at least TWO proctored exams on campus or approved college/military testing center). The lecture notes, quizzes, activities, web tutorials, discussion forums, and exams will be accessed via internet. You are required to read the textbook and additional readings from the internet. There are many activity options, which range from many interactive web activities (on your computer), isolating DNA from food (in your kitchen or at FC lab), separating DNA by agarose gel electrophoresis (at FC lab), touring the Orange County Sheriff’s Forensics Department in Santa Ana (not available every semester).

- During the first half of the course, we will survey many common genetic diseases, their inheritance patterns, and resources for medical information. During the second half of the course, we will explore the basics of molecular biology, current biotechnological advances and associated ethical problems for society.

- This is considered a non-majors course (with no prerequisites), though biology majors are certainly welcome. It will be an intense class … and requires LOTS of reading, time, internet usage and self-motivation! Online courses usually are harder and require MORE time than campus courses, but have the advantages of convenience and flexibility.

- After completing and passing the course, you should be able to understand how certain diseases are transmitted in your family and many of the biotechnology updates in future public news releases. It will not be an easy class, but it will be a very interesting course (I am biased, of course!)

GRADING SCALE (if you attain proctored exam average) == A > 90%; B > 80%; C > 65%; D > 55%. Review the departmental policy about the minimum 65% average for two proctored exams. I reserve the right to make minor adjustments to assignments.

<table>
<thead>
<tr>
<th>The Fall 2017 Bio 109 course grade is based on 640 points:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Exams (Unit 1 and Unit 4)</td>
<td>100 points x 2 = 200 pt</td>
</tr>
<tr>
<td>Proctored Exams (Unit 2, Unit 3, Cumulative Final) – must attain 65% average for two proctored exams</td>
<td>100 points x 2 = 200 pt</td>
</tr>
<tr>
<td>15 Online, Open-book Quizzes</td>
<td>10 pt each x 15 = 150 pt</td>
</tr>
<tr>
<td>15 Open-book Crossword Puzzles</td>
<td>3 pt each x 15 = 45 pt</td>
</tr>
<tr>
<td>Choose 3 Activities (writing component)</td>
<td>15 pt each x 3 = 45 pt</td>
</tr>
<tr>
<td>Bonus Tutorial Quizzes (1 point each, max of 20 points)</td>
<td>(20 pt)</td>
</tr>
</tbody>
</table>

**Department Policy - You must attain at least 65% average in two proctored exams in order to PASS the course.** Unit 1 exam and the Unit 2 exam are given as the proctored exams. Those scores are provided to you before the last official drop date. If the average of the two proctored exams is below 65%, YOU could choose to drop the course by the Drop Deadline or stay in the course (and take the proctored cumulative final exam to replace one Unit exam score).

**Example:** A student has 80% in total course points with a 60% average in two proctored exams, the course grade is a D. A student with 66% in total points with 75% average in two proctored exams, the course grade is a C.


- TENTH edition. ISBN 9780073525303 or 0073525308. No Connect available.
- ELEVENTH edition. print ISBN 9780073525365 or ebook 9780077658892 or Connect 9780077658922 (recommended)

Connect (includes ebook) is the digital interactive learning program, that past students found helpful. I have formally adopted the older edition, so that the book is cheaper for you. But you MUST have a textbook, as you will definitely need to read the textbook and take your own notes. You can purchase the printed textbook from the FC bookstore (http://bookstore.fullcoll.edu/) or ebook at https://www.vitalsource.com/referral?term=0077658892. There are advantages to each type - ebook (cheaper, easier to search topics, interactive, but cannot sell back, usable for ## days), traditional paper version (don’t have to read a screen).

ASSIGNMENTS

- **PARTICIPATION.

- BY August 30: You are required to enter the Canvas course server within the first two days of class and post a Student Introduction and fill out a puzzle quiz.
• **EXAMS.** There are two required online unit exams, two required proctored unit exams and one optional proctored cumulative final exam. The proctored cumulative final exam can replace any one unit exam score. The exams will be proctored at Fullerton College free of charge during specified dates. If you cannot attend the exam proctored by Jo Wu, you must contact instructor to make arrangements.
  o If you live outside driving range of Fullerton, you will need to make arrangements to take the proctored exams with an approved proctor at a College Testing Center that is geographically close to you and by the stated deadline. If you are already enrolled at another school, the college testing center usually will administer the exam for you. But be aware that some centers will charge about $35-45 per hour for proctoring the exam.
  o For testing off campus, download the form ProctoredExam.doc, fill out the top portion, and ask the proctor to fill out the bottom portion and email to jwu@fullcoll.edu using their professional email address. I will be checking the professional status of the proctor.

| Department Policy | You must attain at least 65% average in two proctored exams in order to PASS the course. I give Unit 2 and Unit 3 exams as the proctored exams, and will provide those scores to you before the last official drop date. If your exam average at that time is below 65%, YOU would choose to drop the course by Drop Deadline or stay in the course (and take proctored final exam to replace a low unit exam score). |
| Example: A student has 80% in total course points with 60% average in two proctored exams, the course grade is a D. A student with 66% in total points with 75% average in two proctored exams, the course grade is a C. |

• **TEXTBOOK READINGS** are absolutely required. Linked web tutorials are also highly recommended.

• **CROSSWORD PUZZLES.** Students have really liked crossword puzzles to review vocabulary and prepare for topic quizzes. AFTER you have filled in a puzzle, go to the associated Puzzle quiz. You will be given 10 minutes to correctly type the answers of 10 randomly-chosen puzzle clues. There is only one attempt allowed for each puzzle. Spelling counts, including “s” at the end of plural words!!

• **ACTIVITIES.** You will choose to do 3 activities from many formats—research genetic diseases, find current news articles, write quiz questions, hands-on DNA extraction in your kitchen, tour of Forensics lab at OC Sheriff’s department, DNA gel electrophoresis lab at FC, etc. Most activity choices can be done at home on the computer.

• **QUIZZES.** There will be many chapter quizzes and tutorials quizzes that you can take. Yes, this sounds like way too many quizzes—but the quizzes really help you to learn the course in small portions! You can use the lecture notes, textbook, and internet (but NO other person, past exams or quizzes) to find answers to the quiz questions. You are allowed two attempts for each quiz topic, with the higher score recorded. Note that the required chapter quizzes are worth 10 points each and the optional tutorial quizzes are worth 1 bonus point each. Correct answers to the quiz questions will NOT be released, as you should be able to find most of the answers in the notes, book, or web links. You should review quizzes to study for exams.

**WHY TAKE ONLINE COURSE???

• **ADVANTAGES of the online course:** You will be able to work at your own pace and during any hour at your convenience - but you are responsible for meeting all course deadlines. You will need to interact with the instructor and classmates via electronic mail and discussion forums (bulletin boards). Instructor will attempt to answer all student questions via email or webchat sessions.

• **DISADVANTAGES of the online course:** Although I may send you reminder emails about the course, this course requires much independence, self-motivation, responsibility and time-management skills! YOU need to remember to check deadlines, check emails, read the textbook, do activities, take quizzes and exams, and plan your study schedule.
- **Do not miss the deadlines!!** This is the biggest problem for online students. Points are awarded for assignments that are submitted by the deadline (Pacific Time). **Do not procrastinate!!** Genetics is definitely NOT a course that you can procrastinate and wait until the last day to cram all the readings for 5 chapters and expect to do well on the exam.

**HOW TO GET STARTED??**
- Buy the textbook and start reading according to the Course Calendar.
- Be sure that your correct email address is listed as the PREFERRED email address on MyGateway/WebStar. Look for class emails (subject line will always start “Bio 109”) from jwu@fullcoll.edu
- Go to [http://online.fullcoll.edu/](http://online.fullcoll.edu/) and follow the directions and tutorials about using the general course server Blackboard. Enter the link for Bio 109 course section “BIOL 109”. Enter the link “Start Here” to get the course-specific materials.
- Enter the link “Unit 1” to see all of the lecture notes, flashcards, powerpoint handouts, online tutorials for all chapters in Unit 1.
- Enter the link “Quiz Folder” inside Unit 1 to access all of the online puzzle, chapter, tutorial quizzes and exams. Every assignment will have a deadline shown in the title (and should reflect what is listed on the course calendar). Do not miss these deadlines! Once the deadline has passed, the quiz will disappear from view. It is strongly suggested that you learn from your quiz mistakes to study for the exams.
- Enter the link “My Grades” to see all of your quiz scores. Each score links to the attempted quiz, so that you can see your mistakes. Learn from these mistakes, so that you do not repeat them on the second attempt of your quizzes.

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**CAMPUS POLICIES**

**Student Rights and Responsibilities:**
Students are expected to be knowledgeable of the guidelines, policies and procedures in the 2016-2017 Fullerton College Catalog (PDF 4.84 MB), which can be downloaded at [http://www.fullcoll.edu/catalog](http://www.fullcoll.edu/catalog). Only a few policies are listed here. All pages refer to the 2016-2017 catalog.

**Absences:**
While an instructor may drop a student who has poor attendance, if a student wishes to drop a class, it is the student’s responsibility to log onto myGateway and drop. Failure to officially withdraw from a class may result in a grade of “F,” or “NP” being assigned.

**Academic Honesty Policy and Standards of Student Conduct and Discipline Policy:**
Fullerton College has specific policies regarding academic dishonesty (cheating, misconduct, plagiarism, and collusion). The policies may be found on page 26 of the 2016-2017 catalog and **will be strictly enforced at all times.** In many cases, academic dishonesty will result in failing the course, a documented proof placed in your academic records, and your name and infraction reported to the appropriate administrators. Moreover, academic dishonesty may ultimately result in expulsion from the College.

All students are expected to adhere to the Standards of Student Conduct and Discipline Policy as described on page 30 of the 2016-2017 catalog at all times. The Standards of Student Conduct and Discipline Policy **will be strictly enforced at all times.** In accordance with the requirements for due process of law, the College shall follow the established procedures as outlined, including but not limited to removal, suspension, or expulsion.

**Americans with Disabilities Act (ADA) Statement:**
Fullerton College is committed to providing educational accommodations for students with disabilities upon the timely request by the student to the instructor. Verification of the disability must be provided. The Disability Support Services office functions as a resource for students and faculty in the determination and provision of educational accommodations.

**Disability Support Services (DSS):**
Any student who feels he or she may need an academic accommodation based on the impact of a disability should discuss this with the instructor and contact Disability Support Services at 714-992-7099 or visit DSS in Room 842 of Building 840.
The services provided by DSS are described on page 40 of the 2016-2017 catalog. To ensure the health and safety of all students, those who feel they may need evacuation assistance in the event of an emergency should speak with the instructor as soon as possible.

Emergency Response:
If required to evacuate a classroom/building, the instructor will lead you to a clear and safe area away from the building. Take all personal belongings with you. During some emergencies, it may be necessary to stay inside the classroom. If this is required, please remain seated and listen to the instructor. Please maintain order during any emergency, and always look out for your own safety and the safety of your classmates.

CAMPUS SUPPORT SERVICES

**Academic Support Center:**
The Academic Support Center at Fullerton College offers various forms of services to students including free tutoring, workshops, group tutoring, writing consultation, and computer access to assist students in their academic development and success. The Academic Support Center includes three centers located in the LLRC, each designed to address specific student needs. The Math Lab is also available in the LLRC and provides similar services for students directed at Math.

<table>
<thead>
<tr>
<th>Service</th>
<th>Location</th>
<th>Phone Number</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Lab</td>
<td>Room 807</td>
<td>(714) 992-7140</td>
<td><a href="http://math.fullcoll.edu/mathlab.html">http://math.fullcoll.edu/mathlab.html</a></td>
</tr>
<tr>
<td>Skills Center</td>
<td>Room 801</td>
<td>(714) 992-7144</td>
<td><a href="http://skills.fullcoll.edu/">http://skills.fullcoll.edu/</a></td>
</tr>
<tr>
<td>Tutoring Center</td>
<td>Room 806</td>
<td>(714) 992-7151</td>
<td><a href="http://tutoringcenter.fullcoll.edu/">http://tutoringcenter.fullcoll.edu/</a></td>
</tr>
<tr>
<td>Writing Center</td>
<td>Room 801</td>
<td>(714) 992-7153</td>
<td><a href="http://writingcenter.fullcoll.edu/">http://writingcenter.fullcoll.edu/</a></td>
</tr>
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**Campus Safety Phone Number:**
Call 714-992-7080 to contact Campus Safety. During an emergency dial 714-992-7777. There are many Emergency Phones throughout the campus that will immediately connect with a Campus Safety Officer. Feel free to ask for escort to the parking lots during evening hours.

**Computer Labs:** [http://fcnet.fullcoll.edu/complabs.htm](http://fcnet.fullcoll.edu/complabs.htm)
You will need to purchase Printing Credit at the FC Bookstore and show your receipt, so that you can print in the labs.

**Extended Opportunity Program and Services (EOPS):** [http://eops.fullcoll.edu/](http://eops.fullcoll.edu/)
The Extended Opportunity Program & Services (EOPS) is dedicated to recruit and successfully retain college students of educationally and socioeconomically disadvantaged backgrounds.

**FC Foundation:** [http://www.fullertoncollegescholarships.com/](http://www.fullertoncollegescholarships.com/)
Apply for scholarships and grants for continuing and transfer students from November to February. Please note that there are general scholarships awarded by the Foundation Office and others awarded by FC Divisions (to their majors).

**Library:** 714-992-7039 [http://library.fullcoll.edu/](http://library.fullcoll.edu/)
You will need a current campus ID to check out library books.

**Transfer Center** ([http://transfer.fullcoll.edu/](http://transfer.fullcoll.edu/)) and Cadena Cultural Center: [http://cadena.fullcoll.edu/](http://cadena.fullcoll.edu/)
These two centers provide services that enhance awareness of campus diversity, facility transfer to colleges and universities, and promote student development and lifelong learning. Check the calendar often for special events, application deadlines, workshops, and visits with university representatives.

**Tutoring and Supplemental Instruction.**
- FC Tutoring Center in room 806 (walk-in and by appointment) [http://tutoringcenter.fullcoll.edu/](http://tutoringcenter.fullcoll.edu/)
- Science PAL for Biology, Chemistry, Physics in room 415-P (schedule at [http://goo.gl/BR4nHW](http://goo.gl/BR4nHW)
- Online 24/7 tutoring (5 hours per term) [http://tutoringcenter.fullcoll.edu/](http://tutoringcenter.fullcoll.edu/)
- Supplemental Instruction may be provided for certain courses by student facilitator or faculty.
- Veterans tutoring veterans at Veterans Resource Center.

**Veterans Resource Center, Room 518:** [http://veterans.fullcoll.edu/](http://veterans.fullcoll.edu/)
Provides in-house and community services, tutoring, and other support for veterans.
## Bio 109: Genetics and Biotechnology in Society

**Jo Wen Wu, Ph.D., Fullerton College**

**Fall 2017 Course Calendar** (Aug 28-Dec 16), CRN 11502

<table>
<thead>
<tr>
<th>Date</th>
<th>Deadline</th>
<th>Week</th>
<th>Reading</th>
<th>Crossword Puzzles (3 pt)</th>
<th>Chapter Quizzes (20 pt)</th>
<th>Bonus Tutorial Quizzes (1 pt)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit 1: Cells, Cycles &amp; Cytogenetics</strong></td>
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<tr>
<td>Sept 11</td>
<td></td>
<td>1</td>
<td>Ch 1: What is Human Genome?</td>
<td>Pz: Macromolecules Pz: Cells</td>
<td>Qz: Lewis Ch 1</td>
<td>Qz: Cells</td>
</tr>
<tr>
<td>Sep 11</td>
<td></td>
<td>2</td>
<td>Ch 2: Cells</td>
<td>Pz: Mitosis</td>
<td>Qz: Lewis Ch 2</td>
<td>Qz: Mitosis &amp; Meiosis</td>
</tr>
<tr>
<td>Sep 18</td>
<td></td>
<td>3</td>
<td>Ch 3: Meiosis, Development and Aging</td>
<td>Pz: Meiosis</td>
<td>Qz: Lewis Ch 3</td>
<td></td>
</tr>
<tr>
<td>Sep 25</td>
<td></td>
<td>4</td>
<td>Ch 13: Chromosomes</td>
<td>Pz: Cytogenetics</td>
<td>Qz: Lewis Ch 13</td>
<td>Qz: Cytogenetics</td>
</tr>
<tr>
<td><strong>Drop w/ No W = Sep 10</strong></td>
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<tr>
<td><strong>Closed-book Proctored Unit 1 Exam</strong> (Sep 27 Tue at 6-8 pm in Room 426)</td>
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<tr>
<td><strong>Unit 2: Transmission Genetics</strong></td>
<td>Oct 2</td>
<td>5</td>
<td>Basic Genetic Terminology</td>
<td>Pz: Genetic Terms</td>
<td>Qz: Genetic Terms</td>
<td>Qz: Genetic Terms</td>
</tr>
<tr>
<td></td>
<td>Oct 9</td>
<td>6</td>
<td>Notes: Two-Gene Crosses</td>
<td>Qz: Lewis Ch 4</td>
<td>Qz: Lewis Ch 5</td>
<td>Qz: 2-Gene Crosses</td>
</tr>
<tr>
<td>On-Campus Help Sessions: Oct 3-5 afternoons &amp; Tue evening</td>
<td>Oct 16</td>
<td>7</td>
<td>Ch 5: Beyond Mendel’s Laws</td>
<td>Qz: Lewis Ch 6</td>
<td>Qz: Sex-Linkage</td>
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<td>Oct 23</td>
<td>8</td>
<td>Ch 7: Multifactorial Traits</td>
<td>Qz: Lewis Ch 7</td>
<td>Qz: Pedigrees</td>
<td></td>
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<tr>
<td><strong>Closed-book Proctored Unit 2 Exam</strong> (Oct 25 Tue at 4-6 pm in Room 426)</td>
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<tr>
<td><strong>Unit 3: Molecular Genetics</strong></td>
<td>Oct 30</td>
<td>9</td>
<td>Ch 9: DNA Structure and Replication</td>
<td>Pz: DNA</td>
<td>Qz: Lewis Ch 9</td>
<td>Qz: DNA &amp; RNA</td>
</tr>
<tr>
<td>Nov 6</td>
<td></td>
<td>10</td>
<td>Ch 10: Gene Action from DNA to Proteins</td>
<td>Pz: RNA Pz: Protein Synthesis &amp; Mutations</td>
<td>Qz: Lewis Ch 10</td>
<td>Qz: Protein Synthesis &amp; Mutations</td>
</tr>
<tr>
<td><strong>Drop w/ W = Nov 19</strong></td>
<td>Nov 13</td>
<td>11</td>
<td>Ch 12: Gene Mutation</td>
<td>Pz: Gene Regulation</td>
<td>Qz: Lewis Ch 11</td>
<td>Qz: Lewis Ch 12</td>
</tr>
<tr>
<td>Nov 20</td>
<td></td>
<td>12</td>
<td>Ch 18: Genetics of Cancer</td>
<td>Pz: Cancer Genetics</td>
<td>Qz: Lewis Ch 18</td>
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<tr>
<td><strong>Online Unit 3 Exam due Nov 30 Wed</strong></td>
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<tr>
<td><strong>Unit 4: Biotechnology &amp; Genomics</strong></td>
<td>Dec 4</td>
<td>13</td>
<td>Ch 19: Genetic Technologies</td>
<td>Pz: Genetic Engineering</td>
<td>Qz: Lewis Ch 19</td>
<td>Qz: Biotechnology</td>
</tr>
<tr>
<td>Dec 4</td>
<td></td>
<td>14</td>
<td>Ch 20: Genetic Testing</td>
<td>Pz: Gene Therapy</td>
<td>Qz: Lewis Ch 20</td>
<td></td>
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<tr>
<td>Dec 11</td>
<td></td>
<td>15</td>
<td>Ch 21: Reproductive Technology</td>
<td>Pz: Repro Tech</td>
<td>Qz: Lewis Ch 21</td>
<td></td>
</tr>
<tr>
<td>Dec 16</td>
<td></td>
<td>16</td>
<td>Ch 22: Genomics</td>
<td>Pz: Genomics</td>
<td>Qz: Lewis Ch 22</td>
<td>Qz: DLC Romanov Mystery</td>
</tr>
<tr>
<td>Dec 17</td>
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<tr>
<td><strong>Online Unit 4 Exam</strong></td>
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**Dec 12-16: Proctored Cumulative Final Exam (optional)**

**Dec 18: Online Required Activity Portfolio due**