CELL BIOLOGY
BIOLOGY 3410.001 (Labs .101/.102/.103)

Department of Life Sciences
Fall 2016

A. COURSE INFORMATION
Course number/section: BIOLOGY 3410.001
Class meeting time: M, W, F 10:00-10:50 [Labs 103: M 2:00-4:50; 101: T 2:00-4:50; 103: T 5:30-8:20]
Class location: OCNR 115 (Labs: EN 301)
Course Website: See BlackBoard (https://bb9.tamucc.edu/)

B. INSTRUCTOR INFORMATION
Instructor: Kirk Cammarata
Office location: EN 319 B (Research Lab: CS 127)
Office hours: W, R 2:00-3:30; T 8:00-10:00
Telephone: 361-825-2468
e-mail: kirk.cammarata@tamucc.edu
Appointments: Email or call to check on my availability at other times or to make an appointment

C. COURSE DESCRIPTION
Course Description
A study of cellular structures and processes to explore strategies for cellular and organismal function. Emphasis will be placed on the biology and chemistry of basic cellular mechanisms. Topics include biomolecules, cellular architecture, gene regulation, catabolism, protein structure and function, membrane structure and function, transport, enzymes, cellular trafficking, cytoskeleton, cell communication/signal transduction, regulation of cell proliferation and cancer. Laboratory will emphasize basic techniques and data analysis common to the overlapping fields of cell biology, biochemistry, and molecular biology. Hot topics include genomics approaches. Critical thinking and analytical skills are practiced.

D. PREREQUISITES AND COREQUISITES
Prerequisites
Genetics (BIOL 2416) and Organic Chem I (CHEM 3411)
Corequisites
SMTE 0092
E. REQUIRED TEXTBOOK(S), READINGS, RESOURCES AND SUPPLIES

Required Textbook(s)

There are flexible purchasing options available for Essential Cell Biology, Fourth Edition, including hardback, loose-leaf, and e-books. Through the end of September GarlandScience.com offers a 25% discount and free standard shipping on print products from the website, and a $50 six-month e-book rental.

Print
Visit garlandscience.com/ecb4 and apply promo code DGL94 at checkout to take advantage of this special 25% off and free standard shipping promotion on print books:

<table>
<thead>
<tr>
<th>Option</th>
<th>ISBN</th>
<th>Original Price</th>
<th>Discounted Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardback</td>
<td>978-0-8153-4454-4</td>
<td>$155</td>
<td>$116.25</td>
</tr>
<tr>
<td>Loose-leaf</td>
<td>978-0-8153-4525-1</td>
<td>$110</td>
<td>$82.50</td>
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E-book
Essential Cell Biology is available in a variety of e-book formats, including lifetime purchase, rental, and individual chapters. There is a $50 six-month rental available through the end of September.

Students should visit garlandscience.com/ecb4-ebook to rent the $50 e-book for Essential Cell Biology, normally priced at $78.

Other Resources
Text-Associated Website with student resources: www.garlandscience.com/ECB4-students

BlackBoard: Course-associated site for posting notes, supplemental readings, laboratory handouts, lab data, announcements, links to websites, etc.
**Course Listserv:** All students must subscribe to the class listserv, using your official University-mandated email account (firstinitiallastname@islander.tamucc.edu). You may ask questions of interest to the instructor or other students on the class listserv, e.g. clarification of an assignment, as well as receive important class announcements. You are encouraged to subscribe to the Opportunities Listserv as well.

To subscribe, send an e-mail to “Cellbio-list-request@Listserv.tamucc.edu”. Make sure that your e-mail address appears in the “From:” heading, and that the word “subscribe” is typed in the subject line. You will receive a subscription acknowledgement confirming that you have done everything correctly. To post messages to the listserv, send to “Cellbio-list@Listserv.tamucc.edu”. Because of security concerns, you should post messages from the official TAMUCC computer account (Islander) that is used to subscribe to the listserv. At the end of class, please send an e-mail to “Cellbio-list-request@Listserv.tamucc.edu” with “unsubscribe” in the subject heading. Please use this service to ask questions about class materials, dates, assignments, etc.

You should also subscribe to the Opportunities Listserv using the same procedure: “opportunities-list-request@Listserv.tamucc.edu”. This service provides notification of scholarships, research and volunteer opportunities and science-related job opportunities.

**List of Supplies**

You will need a laboratory notebook, “sharpie”, calculator, laboratory coat, safety glasses and access to the internet.

**Laboratory Instructors and Contact Info:**

Section .103  Mon 2:00-4:50  K. Cammarata  Office Hrs: See Above

Section .101  Tues 2:00-4:50  Office Hrs: EN 301

Supplemental Instruction (SI): An SI instructor will be available to assist you in your studies. Please take advantage of this resource, funded through the SOAR Program.

SI Instruction: ???  Dates, Times & Locations TBD

SI Instructor: TBD  Office Hrs: Glasscock BldgWed 2:00-3:00 & Thurs 10:00-11  Dcantu5@islander.tamucc.edu
F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

**By the end of this course, students should be able to:**

1. List the major macromolecules found in the cell and the monomers from which these polymers are constructed.
2. Explain the properties of each class of macromolecule and the roles that each plays in various cellular functions.
3. Describe the properties of water and the roles it plays in all cellular processes, e.g., protein folding.
4. Describe the structure and differentiate the functions of the major parts of the cell, including:
   - cell (plasma) membrane
   - nucleus
   - chromosomes
   - nucleolus
   - mitochondria
   - chloroplasts
   - endosomes
   - lysosomes
   - endoplasmic reticulum
   - peroxisomes
   - ribosomes
   - golgi complex
   - cytoskeleton
   - Clathrin-coated vesicles
   - extracellular matrix
5. Explain the properties of biological membranes and transport of molecules and signals across them.
6. Describe the roles of ATP and NADH (NADPH) in metabolism and explain how electron transport is linked to ATP generation.
7. Describe how proteins and membrane lipids are trafficked through cells.
8. Explain how information flow embodied by the Central Dogma can be used to study cells and manipulate gene expression.
9. List components of the cytoskeleton and describe how they maintain or modify cell structure.
10. Describe techniques for characterizing DNA and proteins.
11. Provide examples of signaling mechanisms in cells and organisms.
12. Describe regulation and control of the cell cycle.
13. Describe alterations to cell regulation which accompany cancer.
Students should have appropriate skills to be able to:
1. Propose practical experimental procedures to:
   a. fractionate, label or visualize specific cellular compartments or components.
   b. identify, quantify, and characterize protein and nucleic acid.
2. Use the following equipment in a safe and professional manner:
   a. high power light and phase-contrast microscopes
   b. centrifuge
   c. spectrophotometer
   d. thermal cycler & gel imager
   e. electrophoresis equipment
   f. micropipetting devices
3. Graph and interpret the results of cell biology experiments.
4. Communicate experimental procedures, results and outcomes in a professional manner.
5. Perform basic laboratory mathematics including concentration and dilution calculations.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

This course will utilize traditional lecture, discussions, in-class demonstrations/animations, and coordinated laboratory learning experiences to: 1) integrate conceptual learning and skills development; 2) explore the relationships between cellular structure and function; and 3) experience how cell biologists study cells. Each topic builds upon the previous one in a progressive manner, and is made relevant to organismal function. The course is capped off by studying the alterations associated with cancer.

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>LECTURE</td>
<td>75%</td>
</tr>
<tr>
<td>3 Hourly Exams</td>
<td>60</td>
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<tr>
<td>Final Exam</td>
<td>20</td>
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<tr>
<td>Assignments, Participation</td>
<td>20</td>
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<tr>
<td>LABORATORY</td>
<td>25%</td>
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<tr>
<td>Lab Reports/Assignments</td>
<td>60</td>
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<tr>
<td>Lab Quizzes</td>
<td>40</td>
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</tbody>
</table>
Tentative Evaluation: Your final grade will be based on the percentage you earn out of the total possible points, weighted as specified below. Individual extra credit is not possible, but bonus points may be built into exams or other assignments. Statistical manipulations, if used (at the Instructor’s discretion), will be performed only once, at the end of the semester. A 10-point grading scale will be used:

A = 90 - 100 %  
B = 80 - 89.9 %  
C = 70 - 79.9 %  
D = 60 - 69.9 %  
F = 0 - 59.9 %

Components of Course Grade (Tentative)

I. Lecture (75 %)
   - 3 Exams @ 100 pts = 300
   - Final Exam = 100
   - Quizzes; Other Assignments (Tentative) = 100

II. Laboratory (25 %)
   - Lab Reports/Assignments = 150
   - Lab Quizzes = 100

The time and grading schedule may require adjustment. Should this be the case, the assignments and weighting may change slightly. Additional assignments may or may not be provided at the Instructor’s discretion. Such assignments might include homeworks, group projects, reading assignments, quizzes, seminar attendance, etc. Regardless of any such changes, the lecture and laboratory weighting of your grade shall remain at 75 % and 25 %, respectively. For example, if you make 90 % of total points available for the lecture and 80 % of total points available for the laboratory portion, then your grade would be calculated as:

$\frac{(0.9 \times 75) + (0.8 \times 25)}{100} = \frac{67.5 + 20}{100} = 87.5/100$ possible = B

An assignment will likely be due during the last week of class.

Every attempt will be made to follow the time and evaluation schedules shown here. It is the student’s duty to attend each class session, read messages from the Listserv and to be aware of all assignments, deadlines, changes.

Exams will be a mixture of multiple choice, matching, fill-in the blank, short answer, labeling, calculations and essay questions. Questions are often relatively long and detailed compared to what you may have seen in some introductory courses. Some will require analysis and interpretation of data or experimental design to assess critical thinking skills. Some questions will be derived from laboratory activities. The Final Exam (Wednesday, Dec. 14 from 8:00 - 10:30 AM) will contain new material from the end of the semester.

Quizzes may be given at any time in class. There will be no makeups. Homeworks and other assignments may be given in class. The other assignments may include data interpretation, experimental design, calculations, opinion papers, research article summaries, etc. They will generally be due at the start of lecture class the following week, but some assignments will be in-class only and makeups are
not possible. You are encouraged to get together and work on them as a group. However, unless specified otherwise, the assignments must be turned in individually and be written in your own words, NOT COPIED. An assignment grade of ZERO will be given if the work is not in your own words.

All assignments and examination answers must be legible to the Instructor. Illegible answers will receive a “0”.

I. COURSE CONTENT/SCHEDULE

Important Dates:

<table>
<thead>
<tr>
<th>Classes Begin</th>
<th>August 24</th>
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<tbody>
<tr>
<td>Last day to register</td>
<td>August 31</td>
</tr>
<tr>
<td>Labor Day</td>
<td>Sept 5</td>
</tr>
<tr>
<td>Last Day to Drop without record</td>
<td>November 11</td>
</tr>
<tr>
<td>Reading Days</td>
<td>Nov 22, 23</td>
</tr>
<tr>
<td>Last Day to withdrawal</td>
<td>December 5</td>
</tr>
<tr>
<td>Last Class Day</td>
<td>December 6</td>
</tr>
<tr>
<td>Reading Day</td>
<td>Dec 7</td>
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**FINAL EXAM** Wed December 14 (8:00 – 10:30 AM)

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>ACTIVITIES</th>
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<tbody>
<tr>
<td>Wk1: Aug 24, 26</td>
<td>Cells, Organelles, Genomes, Microscopy (Ch 1); SOAR &amp; SI Presentations</td>
<td>No Lab; Take-Home Lab Handouts To Work On</td>
</tr>
<tr>
<td>Wk 2: Aug 29, 31; Sept 2</td>
<td>Microscopy, Water, Chemical bonds, Macromolecules (Ch 1, 2)</td>
<td>Lab 1: Intro; Lab Cals; Take-Home Lab Handouts To Work On</td>
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<tr>
<td>Wk 3: Sep 7, 9</td>
<td>Labor Day Holiday – NO LABS; Macromolecular interactions, Energetics, Enzymes, Prot Str &amp; Catalysis (Ch 2, 3)</td>
<td>No Labs; Take-Home Lab Calc Handout To Work On</td>
</tr>
<tr>
<td>Wk 4: Sep 12, 14, 16</td>
<td>Protein conformation &amp; energy, Protein functions &amp; motions; (Ch 4)</td>
<td>Lab 2: Lab Cals, Pipetting; Lab Calc &amp; Spectrophotometry Handouts To Work On</td>
</tr>
<tr>
<td>Wk 5: Sep 19, 21, 23</td>
<td>Protein functions &amp; motions; Catalysis; Antibodies &amp; Regulation (Ch 4)</td>
<td>Lab 3: Lab Cals; Lab Quiz 1; Microscopy Comparison</td>
</tr>
<tr>
<td>Wk 6: Sep 26, 28, 30</td>
<td>Membrane structure (Ch 11)</td>
<td>EXAM I</td>
</tr>
<tr>
<td>Wk 7: Oct 3, 5, 7</td>
<td>Membrane transport, membrane potential (Ch 12); Catabolism Overview (Ch 13)</td>
<td>Lab 5: Enzyme analysis I</td>
</tr>
<tr>
<td>Wk 8: Oct 10, 12, 14</td>
<td>Mitochondria: Ox Phos, E.T.,Proton</td>
<td>Lab 6: Enzyme</td>
</tr>
<tr>
<td>Week</td>
<td>Dates</td>
<td>Topic</td>
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<tr>
<td>Wk 9</td>
<td>Oct 17, 19, 21</td>
<td>Intracellular compartmentation/transport (Ch 15)</td>
</tr>
<tr>
<td>Wk 10</td>
<td>Oct 24, 26, 28</td>
<td>Protein Sorting: translocations, vesicular, secretory &amp; endocytic paths (Ch 15)</td>
</tr>
<tr>
<td>Wk 11</td>
<td>Oct 31; Nov 2, 4</td>
<td>Cell communication: Types &amp; principles, G-proteins (Ch 16)</td>
</tr>
<tr>
<td>Wk 12</td>
<td>Nov 7, 9, 11</td>
<td>Cell communication: G-prot- &amp; enzyme-linked receptors (Ch 16)</td>
</tr>
<tr>
<td>Wk 13</td>
<td>Nov 14, 16, 18</td>
<td>Cytoskeleton: Intermediate filament, microtubules, Actin (Ch 17); EXAM III (TBD)</td>
</tr>
<tr>
<td>Wk 14</td>
<td>Nov 21</td>
<td>[Ha-Ha] Cell cycle, division and control; Cell death (Ch 18); Thanksgiving Holiday</td>
</tr>
<tr>
<td>Wk 15</td>
<td>Nov 28, 30; Dec 2</td>
<td>Tissues/matrix/junctions; Cancer (Ch 20)</td>
</tr>
<tr>
<td>Wk 16</td>
<td>Dec 14</td>
<td>FINAL EXAM; 8:00 – 10:30 AM</td>
</tr>
</tbody>
</table>

The time and point schedule may require adjustment. Additional assignments may or may not be provided at the Instructor’s discretion. Such assignments might include homeworks, group projects, reading assignments, quizzes, etc. Every attempt will be made to follow the time and evaluation schedules shown here. **It is the student’s duty to attend each class session, subscribe to the listserv, and regularly visit BlackBoard to be aware of all assignments, deadlines, and changes to such.**
Other Course Requirements:

1. All Exams are the property of the Instructor as they will be saved for course records.

2. All students must access BlackBoard on a regular basis to watch for class announcements, changes, and for laboratory materials, readings, etc.

For help with access to BlackBoard, email or internet, please contact the IT Helpdesk by phone (825-2692) or electronically (computer.helpline@tamucc.edu; http://it.tamucc.edu/selfservice/index.html)

3. Attendance at lecture and lab, preparedness and participation in all learning activities is required and counts towards your participation points. Assignments cannot be made up later if absent without a recognized excuse (see below).

J. COURSE POLICIES

Attendance/Tardiness

Attendance is the student’s responsibility. You are responsible for the material covered in every lecture or online activity, regardless of your (lack of) attendance or participation. Nothing missed during an unexcused absence can be made up. An excused absence allows us to make alternative arrangements to complete an assignment. Only unavoidable absences are excused. Routine events (non-emergency medical visits, parent-teacher conferences, household or auto repairs) should be scheduled to avoid conflicts with class. Plane tickets booked to conflict with class do NOT constitute an excusable absence. An acceptable excuse must be:

• from an appropriate source (doctor, dentist, funeral director) who states the nature and dates of the event

• in writing, on official letterhead, and signed (it will not be returned)

• presented prior to, or within 3 days of, the absence

Late Work and Make-up Exams

Nothing missed during an unexcused absence can be made up. An excused absence allows us to make alternative arrangements to complete an assignment. Only unavoidable absences are excused. Routine events (non-emergency medical visits, parent-teacher conferences, household or auto repairs) should be scheduled to avoid conflicts with class. Plane tickets booked to conflict with class do NOT constitute an excusable absence. An acceptable excuse must be:

• from an appropriate source (doctor, dentist, funeral director) who states the nature and dates of the event

• in writing, on official letterhead, and signed (it will not be returned)

• presented prior to, or within 3 days of, the absence

There are No make-up examinations: For some scheduled events, you may arrange to take a lecture exam before, but not after, its scheduled time.
Cell Phone Use
As adult university students, you are expected to act with courtesy and common sense. Disruptive, disrespectful, or abusive language/behavior towards anyone in class (student, staff, faculty) will not be tolerated and could result in permanent removal from class. This includes tardiness to class, talking in class, insubordination, and electronic disturbances (cell phones, ipods, etc). **Turn it off unless specifically being used for class.**

Missed Exam
See Above.

Participation
All students are expected to attend the **full** class and lab periods, complete all learning assignments, complete reading assignments fully and carefully, and to participate in class discussions. A portion of your grade is earned by participation.

Expectations:
You are responsible for your own education. Take notes in class, during lab discussions, and when completing assignments. Ask questions when you have them and seek help when you need it. The instructor is here to help you. Be aware of university-imposed deadlines (ie drop dates).

K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.
• **Statement of Civility**
Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must be submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• **Disability Services**
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you
believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**L. OTHER INFORMATION**

- **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes during lecture.