GENOMICS, PROTEOMICS AND BIOINFORMATICS
BIOLOGY 4340.001/5340.001

Department of Life Sciences
Fall 2019

A. COURSE INFORMATION
Course number/section: BIOL 4340.001/5340.001
Class meeting time: T, R 11:00-12:15
Class location: CI 127
Course Website: See BlackBoard (https://bb9.tamucc.edu/)

B. INSTRUCTOR INFORMATION
Instructor: Kirk Cammarata
Office location: TH 338 (Research Lab: TH 314)
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
An introduction to integrative biological study using genome-wide approaches and bioinformatics. The “-omics” technologies (genomics, transcriptomics, proteomics, metabolomics, etc) will be reviewed for current and potential contributions to understanding biological function at molecular, cellular, organismal and ecosystem levels. Applications to various biological disciplines will be emphasized. Emphasis on DNA-sequencing based approaches. Hands-on bioinformatics demonstrations will be included.

Learn about advanced DNA sequencing technologies, interpretation of the Human Genome, gene expression measurements, molecular identification strategies, and organismal community approaches. Introduction to some critical skills in bioinformatics. Course is required for Cell/Molecular Track and very relevant to majors in Biomedical Sciences, Integrative Biology, Plant/Animal/Micro Biology, Biochemistry and others.

D. PREREQUISITES AND COREQUISITES
Prerequisites Genetics (BIOL 2416) AND equivalent of one advanced course such as Cell Bio, Molecular Bio, Biochemistry I, Virology, Human Genetics, Medical Microbiology OR Permission of Instructor
Corequisites None
E. REQUIRED TEXTBOOK(S), READINGS, RESOURCES AND SUPPLIES

Required Textbook(s)
ISBN 9780815345084
[I do NOT recommend earlier editions] Additional readings will be assigned from scientific literature, placed on library reserve, posted to BlackBoard, or via links made available on BlackBoard.

Other Resources
It may be helpful to access (borrow or use library copies) a genetics or molecular biology book to use as a reference. You may be able to borrow one if you do not own one. Cell Biology, Molecular Biology and/or Biochemistry texts may also be useful and may be on reserve.

BlackBoard: Course-associated site for posting notes, required and supplemental readings, assignments, important announcements, study guides, links to websites, etc. You MUST access this regularly and read messages!

List of Supplies
You must have access to a computer and internet. You may wish to bring your own laptop to class for work on some of the bioinformatics tutorials, which will be announced ahead of time.

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. Conceptualize the function of organisms at the levels of the genome, the transcriptome, the proteome and the metabolome
2. Describe the complexities of gene expression and regulation targeted by the different –omics approaches
3. Describe basic experimental approaches and methodologies associated with genome sequencing, transcriptomics, proteomics and metabolomics
4. Outline the approaches originally used to sequence the human genome (as a model) and contrast them with modern “NextGen” Sequencing-based approaches for new genomes
5. Describe/distinguish “2nd and 3rd Generation” DNA sequencing technologies and their advantages and disadvantages
6. Describe the contribution and utility of databases, bioinformatics and data mining in the application of the “-omics” technologies.
7. Describe the theoretical bases for assembly and sequence comparisons, including alignment, scoring and shortcuts.
8. Perform raw sequence processing and quality evaluation.
9. Describe applications of genomics technologies in medicine, agriculture and environmental science.
10. Describe the concept of “Systems Biology” as distinct from traditional biological disciplines.
11. Analyze DNA sequence data using publicly available resources such as NCBI BLAST, DNA SUBWAY, and GALAXY.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

This course will utilize traditional lecture, paper discussions, in-class demonstrations/animations, bioinformatics tutorials and take-home assignments. Seminar and/or Webinar attendance outside of class will be required.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Tentative Evaluation: Your final grade will be based on the percentage you earn out of the total possible points, weighted as specified below. Note that there are different expectations and grading rubrics for undergraduate vs graduate students. 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 %

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.
UNDERGRADUATE COURSE:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMS &amp; QUIZZES</td>
<td>60%</td>
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<tr>
<td>2 Exams</td>
<td>60</td>
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<tr>
<td>4 Quizzes</td>
<td>40</td>
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<tr>
<td>HOMEWORKS &amp; ASSIGNMENTS</td>
<td>30%</td>
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<tr>
<td>ATTENDANCE/IN-CLASS PARTICIPATION</td>
<td>10%</td>
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Components of Undergraduate Course Grade (Tentative)

<table>
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<tr>
<th>Component</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>2 Exams (exams @100)</td>
<td>200</td>
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<tr>
<td>4 Quizzes (quizzes @35)</td>
<td>140</td>
</tr>
<tr>
<td>Homeworks or Other Assignments (30%)</td>
<td>160</td>
</tr>
<tr>
<td>Attendance/Participation (10%)</td>
<td>50</td>
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| TENTATIVE TOTAL                                           | 550    |

GRADUATE COURSE:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>EXAMS &amp; QUIZZES</td>
<td>50%</td>
</tr>
<tr>
<td>2 Exams (exams @150)</td>
<td>68%</td>
</tr>
<tr>
<td>4 Quizzes (quizzes @35)</td>
<td>32%</td>
</tr>
<tr>
<td>HOMEWORKS &amp; ASSIGNMENTS</td>
<td>30%</td>
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<tr>
<td>PROJECT/PRESENTATION</td>
<td>10%</td>
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<tr>
<td>ATTENDANCE/IN-CLASS PARTICIPATION</td>
<td>10%</td>
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Components of Graduate Course Grade (Tentative)

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>2 Exams (In-class 100 + Take Home 50)</td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>4 Quizzes (@ 35 pts)</td>
<td></td>
<td>140</td>
</tr>
<tr>
<td>Project/Presentation (10%)</td>
<td></td>
<td>65</td>
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<tr>
<td>Homeworks or Other Assignments (30%)</td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>Attendance/Participation (10%)</td>
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<td>65</td>
</tr>
<tr>
<td><strong>TENTATIVE TOTAL</strong></td>
<td></td>
<td><strong>650</strong></td>
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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 BlackBoard 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. For Graduate Students, there will be additional in-class and/or take-home sections of major exams. The Final Exam (Tuesday, Dec. 10 from 11:00 - 1:30) 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 web-based homeworks, data interpretation, experimental design, calculations, seminar/webinar summaries, opinion papers, research article summaries, etc. They will generally be due at the start of lecture class the following week, but some assignments may 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.

Assignments may include paper reading and discussion, presentation of a paper to class, and hands-on activities like DNA sequence analysis projects (BLAST, DNA SUBWAY, GALAXY), particularly for large datasets, using both GUI and command-line tools. Do Not wait to the last minute to do these assignments, there are often technical difficulties with computer-based assignments and it may take some time to resolve these issues. Please maintain a good attitude and flexibility, and we’ll get through these issues together! [We may work on a special assignment this semester, in which we would use command-line tools to analyze a 16S rRNA itag NGS dataset using a Linux-based command-line pipeline. The goal of this project is to characterize and compare environmental microbiomes.] Graduate Students will be expected to take a leadership role in team projects, perform additional analyses, and to analyze results in greater depth, relative to the undergraduate students.
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>EVENT</th>
<th>DATE</th>
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<tbody>
<tr>
<td>Classes Begin</td>
<td>Aug 26</td>
</tr>
<tr>
<td>Labor Day Holiday</td>
<td>Sept 2</td>
</tr>
<tr>
<td>Last day to register</td>
<td>Sept 3</td>
</tr>
<tr>
<td>12th Class Day</td>
<td>Sept 11</td>
</tr>
<tr>
<td>Last Day to Drop</td>
<td>Nov 8</td>
</tr>
<tr>
<td>Last day to apply for graduation</td>
<td>Nov 14</td>
</tr>
<tr>
<td>Reading Day-No Class</td>
<td>Nov 27</td>
</tr>
<tr>
<td>Thanksgiving Holiday</td>
<td>Nov 28-29</td>
</tr>
<tr>
<td>Last Day to withdrawal</td>
<td>Dec 3</td>
</tr>
<tr>
<td>Last Class Day</td>
<td>Dec 4</td>
</tr>
<tr>
<td>Reading Day</td>
<td>Dec 5</td>
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</tbody>
</table>

FINAL EXAM: Tues December 10 (11:00 – 1:30)

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wk1: Aug 27, 29</td>
<td>Syllabus; Intro Genomics; Extended Central Dogma; Whole-Genome -omics</td>
<td>Ch 1</td>
</tr>
<tr>
<td>Wk 2: Sept 3, 5</td>
<td>Sept 2 Labor Day Holiday; Whole-Genome –omics: Transcriptomes, Proteomes; Metabolomes, Other –omes; Regulation is Key</td>
<td>Ch 1, Read ahead: Ch 2.1-2.3</td>
</tr>
<tr>
<td>Wk 3: Sep 10, 12</td>
<td>Review Mol Bio, DNA Cloning; Genome Maps</td>
<td>Ch 2.1-2.3, Ch 3.1-3.2 Quiz 1</td>
</tr>
<tr>
<td>Wk 4: Sep 18, 19</td>
<td>DNA Markers &amp; Genome Mapping</td>
<td>Ch 3.1-3.2, 3.6 Quiz 1 Review</td>
</tr>
<tr>
<td>Wk 5: Sep 24, 26</td>
<td>Sequencing Genomes: (Cloning; dideoxy chain termination sequencing)</td>
<td>Ch 4 Database Assnmnt</td>
</tr>
<tr>
<td>Wk 6: Oct 1, 3</td>
<td>Next (2nd) Gen DNA Seq Technologies, $1,000 Hu Genome Genome Strategies</td>
<td>Ch 4 + Outside Info</td>
</tr>
<tr>
<td>Wk 7: Oct 8, 10</td>
<td>2nd Generation Sequencing Technologies</td>
<td>Ch 4 + Outside Info</td>
</tr>
<tr>
<td>Wk 8: Oct 15, 17</td>
<td>3rd Gen SMRT Sequencing Technologies</td>
<td>Ch 4 + Outside Info</td>
</tr>
<tr>
<td>Wk 9: Oct 22, 24</td>
<td>Hu Genome Genome Project; Sequencing Strategies</td>
<td>Ch 4 + Outside Info</td>
</tr>
<tr>
<td>Wk 10: Oct 29; 31</td>
<td>Hu Genome Genome Project; Sequencing Strategies; Finishing Genomes</td>
<td>Ch 4 + Outside Info</td>
</tr>
</tbody>
</table>

EXAM I
| Wk 11: Nov 5, 7 | **[Assignment - No classes]**  
Genome Sequencing Strategies for complex genomes  
Genome Annotation & Need for Bioinformatics; Comparative & Functional Genomes Approaches | Ch 4  
Exam Review  
Ch 5 (w/some Ch 6)  
**Genome Annotat Assnmnt** (Due 11-15) |
| Wk 12: Nov 12, 14 | Genome Annotation; Comparative & Functional Genomics Approaches  
Bioinformatics I | **Quiz 3**  
Ch 5  
Ch 6 + Outside Info |
| Wk 13: Nov 19, 21 | Bioinformatics II  
Applications of Seq Technologies: Metagenomics | **Quiz 4**  
Ch 6 + Outside Info  
Outside Sources |
| Wk 14: Nov 26 | **Reading Day Nov 27**  
**Thanksgiving Holiday Nov 28-29**  
Bioinformatics I  
**Barcoding & BLAST Assnmnts** | Ch 6 + Outside Info  
Outside Sources |
| Wk 15: Dec 3 | Genome Evolution | Ch 7.2-7.4; 18.2 |
| Wk 16: **Dec 10** | **FINAL EXAM II**  
11:00 – 1:30 | **FINAL EXAM II** |

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.**

**EXAM RULES:** No calculators, phones, iwatches, cameras, music or bluetooth or other digital devices are allowed anywhere in sight, including desktop, chair or floor! Put them away before entering the classroom! All Exams are the property of the Instructor as they will be saved for course records. Taking, copying, photographing or scanning of exams is forbidden and violation of this policy will result in a failing grade for the course. No one may enter an exam room once the first person has finished.
Tentative Topic List
[See PPT Notes for Specific Reading Assignments]

Introduction to Genomics, Proteomics and Bioinformatics; The “Omics” Technologies
(Ch 1) What is genomics? What do we need to study, understand and interpret genomes?
   Extended Central Dogma
   Overview of different –omics technologies
   Genomes and genome structure: Prok vs Euk genes and genomes
   Transcriptomes, gene structure and transcription mechanisms
   Proteomes and their regulation
   Metabolomics
   Other “-Omes”
   Regulation is key
   Evolution of genomes
   Systems Biology and Synthetic Biology

Review of Basic Molecular Biology Techniques & DNA Cloning
(Ch 2.1 – 2.3)

Genome Maps and Mapping
(Ch 3.1 – 3.2; 3.6)

Sequencing Genomes
(Ch 4)
   Sanger Dideoxy Chain Termination Sequencing
   Second (“Next”) Generation DNA Sequencing Technologies (and their error modes)
   Roche 454, Illumina and ABI Solid
   The $1,000 Human Genome
   3rd Generation Single Molecule Real Time (SMRT) DNA Sequencing Technologies
   Ion Torrent, PacBio SMRT, Nanopore
   Other strategies & advances

Genome Sequencing Strategies
HGP Clone & Seq vs Shotgun vs NGS-Enabled Shotgun

How Do We Analyze All of This Data? Applied Bioinformatics
Handling and manipulating Large Datasets
   Sequence file formats
   Evaluating Quality and Filtering
   Comparisons, Interpretation & Visualization
   Standards

Bioinformatics
   GUI vs Command Line

Genome Annotation and Functional Genomics
(Ch 5 and Ch 6.1-6.2)
Finding and Identification of Functional Parts
   Finding/Predicting Genes and Annotating Genomes: “Signposts”: In silico ORFs

Homology:
   Foundations of Sequence Comparisons
   Pairwise: Dot-Plots
   Aligning and Scoring Alignments for Comparisons: How Matrices are Used
   Shortcuts and Heuristics: Smith-Waterman, BLAST, Pearson FastA
   Assembling Short Reads
   Challenges
DeBruijn Graphs and Burrows-Wheeler Algorithm (BWA)

Transcript-Based Annotation & Mapping
- Experimental verification of predictions

Genome Browsers

Eukaryotic Genomes, Lessons from the HGP, and Genome Evolution
(Ch 7.2-7.4; Ch 18.2)
- Historical Perspectives of Biological Insight: The Human Genome
  - Biological Insights into the Human Genome: Structure, Expression and Selection

Prokaryotic Genomes
(Ch 8.1-8.2)

Transcriptomes
(Ch 12.1) RNA Functionality and Regulation

Applications of DNA Sequencing Technologies
- Signature Genes & itag sequencing for Microbiomes
- Whole-Genome Metagenomics
- Transcriptomics: RNAseq vs DNA Microarray
- Other Applications:
  - Genomic Polymorphisms
  - Genome-Wide Association Studies
  - ChIPseq
  - Etc.
- Applications: Medicine, agriculture, biofuels, environment

Proteomics Technologies and Applications
(Ch 13.1-13.2; 13.5)
- Protein Profiling Methods
- Protein Interactions

Ethical, Legal and Social Implications (ELSI) of Genomics Technologies
**Tentative Hands-On Projects**

1. **(G/UG) Database Exploration:** Guided exploration of several online genomic resources and databases to get a taste of what types of information is available.

2. **(G/UG) Genome Annotation using DNA Subway (Red Line):** A guided example of annotating new genome sequence to identify and predict features to make the sequence data usable.

3. **(G/UG) DNA “Barcoding” using BLAST and DNA Subway (Blue Line):** Use BLAST to compare genome sequences. Then use DNA Subway Blue Line to identify an unknown sample via its DNA Barcode.

4. **(G/UG) In-Class Activity: Linux Tutorial:** Introduction/review of basic command line navigation using Linux.

5. **(G/UG) In-Class Activity: Signature Genes Metagenomics:** Multiple-class project to analyze a large 16S rRNA sequence dataset (generated by HTS) to analyze the community composition and diversity.

6. **(G/UG) Genomics Paper Summary & Class Presentation:** Summarize a paper on a topic relevant to genomics (broadly defined; can include papers in the area of ELSI) and make a brief (10-15 min) presentation to class showing figures from the paper.

7. **(G only) RNAseq Transcriptomics Analysis using Galaxy:** Analyze an RNAseq dataset using the tools available in Galaxy, and prepare a summary.

**Other Course Requirements:**

1. All Exams are the property of the Instructor as they will be saved for course records. Exams may not be removed from class, copied, reproduced or photographed in any way. Violation will result in a grade of “F”

2. All students must access BlackBoard on a regular basis to watch for class announcements, changes, and for assignments, 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, 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:
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 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)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. **Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course.** Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. 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, and the College of Science and Engineering Grade Appeals webpage at 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.