BIOLOGY OF VIRUSES BIOL 4304  
Department of Life Sciences  
Summer II 2016 v5

A. COURSE INFORMATION  
Course number/section: BIOL 4304.001  
Class meeting time: MTWR 8:00 am-9:55 am  
Class location: OCNR 222  
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION  
Instructor: Gregory W. Buck, Ph.D., Associate Professor  
Office location: Center for the Sciences 251  
Office hours: M 10:00-11:15 a.m.; TWR 1:00-2:15 p.m. or by appointment  
Telephone: (361) 825-3717  
e-mail: Gregory.Buck@tamucc.edu  
Appointments: Preferred method is by e-mail

C. COURSE DESCRIPTION  
Catalog Course Description  
Introduction to the study of viruses, including viral life cycles, replication schemes and Baltimore classification of representative bacteriophages, plant and animal viruses. Emphasis on analysis and review of primary literature on viruses.

Extended Course Description  
This course is designed for those students majoring in Biology or Biomedical Sciences, and may be considered as “pre-grad school.” This course entails a survey of major animal and human viruses, bacteriophages, and some plant viruses that cause disease. The course will cover classification of viral groups, methods of viral replication, pathogenesis, and will also describe emerging viral diseases. The focus will be on analysis of current primary literature, and less on textbook descriptions, but a text is still needed for the class. Please see the course schedule for the outline of topics to be covered. The course is not designed to cover all medical aspects of virology and taxonomy described in professional school (MD, DO, DVM, DDS), nor viral treatment modalities.

D. PREREQUISITES AND COREQUISITES  
Prerequisites  
BIOL 2416, BIOL 2421 and CHEM 1311/1111.

Corequisites  
Officially, there are none. However, students who have taken Cell Biology (BIOL 3410), Molecular Biology (BIOL 3403), Immunology (BIOL/BIMS 4406), Physiology (BIOL
3425), and Biochemistry (CHEM 4401/4402), and have the ability to integrate knowledge from these fields and from Genetics and Microbiology, do best in the course.

E. RECOMMENDED TEXTBOOK(S), READINGS AND SUPPLIES

Recommended Textbook(s)
I would strongly suggest that students buy either the first or the second text listed here, as they might be helpful. However, you are NOT required to purchase any of these:

While this text is preferred, I will not rely exclusively on it. The text is also a bit dated.
You can also buy the e-book (ISBN 978-1-1182-1489-3) for less money; go to this site if interested: www.coursesmart.com

This information is a bit watered down from previous editions.

Optional Textbook(s) or Other References

15. http://www.virology.net/garryfavweb.html; Dr. David Sander’s “All the Virology on the Web” site; fairly accurate; accessed 05/22/2016.
Supplies
Textbook(s), tri-fold poster for poster presentation, copies of papers (do off library databases)—I will try to give copies of papers and place on Blackboard if I can legally do it without violating copyright laws, but for clarity of figures, you may wish to get color copies from databases.

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. 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. Describe the structure and components of viruses;
2. Describe the different classification schemes of viruses (Baltimore classification);
3. Explain the molecular basis of pathogenesis for diseases caused by selected viruses;
4. Critique scientific methodology and approaches in studying the etiology of viral infectious agents;
5. Refine skills in critical thinking and writing through analyzing current primary literature;
6. In a group project, synthesize knowledge of experimental design; molecular biology, cell biology, and immunology techniques; and of viruses to justify a hypothetical but scientifically-plausible extension of ideas presented from viral primary literature on a virus not presented in class.

G. INSTRUCTIONAL METHODS AND ACTIVITIES
1. Two exams (Mid-Term and Final, 100 pts. each)—Exams may be split over 2-3 days
   a. Mid-Term exam will be a mixture of short answer, essay, multiple choice (including Type K), descriptive T/F, and cases. Exams may be in-class or take-home, or a combination of both. Class exams normally take 75-90 minutes in length.
   b. If a take-home exam is given, it will have a finite time limit outside of class. You are free to use any sources for the take-home exam, including any materials online, in the library, from your peers in the class. However, you are NOT free to ask faculty at TAMU-CC or elsewhere, graduate students here at TAMU-CC or elsewhere, or undergraduates who have previously taken this course. I also reserve the right to “split” the exams into take-home and in-class components. Missed exams will be allowed make-up only under approved TAMU-CC guidelines, and will be total essay, and will differ in format than the regular exams.
   c. Oral Final Exam
i. Initially, class members will have only five attempts or questions; they will reach in an envelope and take a random question.

ii. Students must attempt an answer within two minutes and finish within five minutes; if you pass, that counts as an attempt.

iii. Extra attempts may be allowed if all class members have had five attempts, provided that all questions have not been answered. If a student answered a question with a low number of possible points (10 pts or fewer), I will give them an additional opportunity.

iv. If students have answered all the questions they feel they need to achieve the desired grade, they are free to leave.

v. Students may use the white board or overhead projector to describe their answer.

vi. No help can be given by other students, or from laptops, tablets, smart phones, notes, texts, or your own copy of the annotated papers.

2. Paper Discussion (25 pts each; total 50 pts.)—Students will be asked in GROUPS of four or five to lead class discussions of primary journal articles. To make sure people don’t rest after their time, I reserve the right to give quizzes to the class. All students will do two presentations, if there are not too many students in the class. If you cannot lead the class when you are asked, I will give you another opportunity if there are valid emergency reasons (family illness or accidents, deaths, funerals). Other events (professional school and job interviews) will be determined on a case-by-case basis. For non-legitimate excuses (as determined by professor), I may deduct 12.5 points for each discussion, and ask you to try again. Students can be asked to do more than two discussions, either for required credit, extra credit or no credit. Caveat: If class size is >25, instructor reserves the right to limit students to one paper discussion worth 50 pts. I WILL increase number of paper discussions required if <15 students are in class. Paper discussions may be used as substitutes for quizzes.

3. Quizzes (50 pts total): Instructor will give 1-5 quizzes, ranging from 5 to 25 points total. Due to the shortened summer session, it is unlikely that make-ups will be given for quizzes. I reserve the right to use any diagnostic assessments as quiz grades. Extra quizzes beyond five, as well as additional paper discussions, may be used for make-up or for extra credit.

4. Group Pre-proposal (100 pts) and Poster Project (100 pts): I am requesting that students work in groups of three to four (3-4) students to undertake a project on a virus not covered in class.
   a. Pre-proposals should focus on molecular biology of virus, or the relation of virus to the immune system (e.g., cytokines), NOT on identification, pathogenesis, treatment, or epidemiology!
      i. Students will read several primary journal articles on viruses not covered in class, then choosing a virus for their project. The group will take a future aim from a primary journal Discussion section,
and formulate one hypothesis on their virus.

ii. The group will write a four (4) page (maximum) “pre-proposal,” in which they include a 250-word abstract, a Background section stating the major features of what is known about this virus, what is NOT known, why this dearth of information is important, formulate a hypothesis, and state two Specific Aims to test this hypothesis. They will also include a References section that is not exhaustive yet comprehensive. Students will be graded on a rubric for experimental design, plausibility, knowledge of virus, ability to synthesize and analyze, and on the level of cooperation and participation in the group project. Late pre-proposals are NOT accepted. PLEASE NOTE THIS ASSIGNMENT IS DUE ONE WEEK AFTER CLASS STARTS!!

b. Poster (100 pts): Students will then do a poster presentation in A-IMRAD form. Posters are NOT to be printed out on the plotters, but instead students will purchase tri-fold display boards (36” x 48” or 91.4 x 122 cm) on which they can place their projects in Abstract-IMRAD form.

i. Each student will be a co-author, and add the top three authors of the most seminal papers used for the project.

ii. Students will describe a detailed research plan in which they will use experiments to “test” this hypothesis, and give results based on what they have read in the literature, as well as a conclusion.

iii. Team members will be graded on a rubric for experimental design, plausibility, knowledge of virus, ability to synthesize and analyze, and on the level of cooperation and participation in the group project.

iv. Students will be responsible for a 15 to 20 min group presentation of their project. Instructor reserves the right to put information from posters on exams. Late poster presentations are not accepted.

v. If all group members are not contributing equally, I will penalize or give differential grades.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Introduction—Please note that Instructor may modify assignments, number of assignments and point values depending on number of students in class. Also note that “any mid-term grades posted on S.A.I.L. and Blackboard are not official University grades, not a guarantee of final grades and are never updated; once they are posted they cannot be changed even if your grade in the class does change.”

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Exams</td>
<td>40</td>
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<tr>
<td>Quizzes</td>
<td>10</td>
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<tr>
<td>Paper discussions</td>
<td>10</td>
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<tr>
<td>Poster Presentation</td>
<td>20</td>
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<td>Pre-proposal paper</td>
<td>20</td>
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# I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>T Jul 5</td>
<td>Introduction to Virology; History, Structure, Replication</td>
</tr>
<tr>
<td>W Jul 6</td>
<td>Molecular Biology tools for viral studies; CRISPR/Cas systems</td>
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<tr>
<td>R Jul 7</td>
<td>Viral Pathogenesis &amp; Immunology</td>
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<tr>
<td>M Jul 11</td>
<td>ss (+) RNA viruses-- Picornavirus, Flavivirus, Corona, Toga; ds: Reoviruses</td>
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<tr>
<td>T Jul 12</td>
<td>(-) stranded RNA viruses: Paramyxvo, Orthomyxvo</td>
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<tr>
<td>W Jul 13</td>
<td>(-) stranded RNA Filoviridae, Rhabdoviridae</td>
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<tr>
<td>R Jul 14</td>
<td>Hepadnaviridae</td>
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<tr>
<td>M Jul 18</td>
<td>Mid term Exam</td>
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<tr>
<td>T Jul 19</td>
<td>DNA Viruses I: Herpesviridae</td>
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<tr>
<td>W Jul 20</td>
<td>Herpesvirus contd; Retroviridae</td>
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<tr>
<td>R Jul 21</td>
<td>Retroviridae contd</td>
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<tr>
<td>M Jul 25</td>
<td>DNA Viruses II: Adeno, Parvo, Circo</td>
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<tr>
<td>T Jul 26</td>
<td>DNA Viruses III: Papilloma, Polyoma, Pox</td>
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<tr>
<td>W Jul 27</td>
<td>Emerging Viruses/Biodefense</td>
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<tr>
<td>R Jul 28</td>
<td>Mimiviruses; Undergrad posters</td>
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<tr>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
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<tr>
<td>1, 2, 3--Acheson; 1, Appendix 3--Cann</td>
<td>Form Groups for Pre-Proposal; see Handouts C, F</td>
</tr>
<tr>
<td>1, 6--Cann</td>
<td>see Handouts B, D</td>
</tr>
<tr>
<td>4, 33, 34, 35 Acheson</td>
<td>Choose virus for Pre-proposal &amp; Poster; Zanin J Virol 2015; see Handout E</td>
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<td>11, 12, 13, 14- Acheson; 3--Cann</td>
<td>Graduate Proposal virus topic due; Noppakun Virol J 2016</td>
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<td>15, 18 Acheson; 3, 6--Cann</td>
<td>Undergrad Pre-proposal due; Schwartzman mBio 2015</td>
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<tr>
<td>15, 16 Acheson; 3--Cann</td>
<td>Kugelman mBio 2015</td>
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<tr>
<td>30 Acheson; 3--Cann</td>
<td>Paper TBA</td>
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<tr>
<td>24 Acheson;</td>
<td>Ray et al J Inf Dis 2012</td>
</tr>
<tr>
<td>28, 29--Acheson; 6, 7--Cann</td>
<td>Paper TBA</td>
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<tr>
<td>28, 29 Acheson; 6, 7--Cann</td>
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<td>20, 23 Acheson</td>
<td>Hannigan mBio 2015</td>
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<tr>
<td>21, 22, 26 Acheson</td>
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<tr>
<td>TBA</td>
<td>Kim mBio 2016</td>
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<tr>
<td>27 Acheson</td>
<td>Campos J Clin</td>
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M Aug 1 Undergrad Posters; Grad Presentations
T Aug 2 Graduate Presentations or TBA
W Aug 3 Oral Final Exam
R Aug 4 Oral Final Exam
F Aug 5 Oral Final Exam

Handouts:
1-Viruses not covered in class
2-Reverse Transcription
B—v5 Fusions
C—v7 Abridged History of Virology
D—v6 Molecular Biology Methods
E—v3 Viruses and Immunology
F—v4 Baltimore Classification

Papers to read this summer for Paper Presentations


Kim Y, Cheon S, Min CK, Sohn KM, Kang YJ, Cha YJ et al. 2016. Spread of mutant Middle East Respiratory Syndrome Coronavirus with reduced affinity to human CD26 during the South Korean outbreak. mBio7(2): e00019-16; doi: 10.1128/mBio.00019-16 [Open access through mBio.asm.org]


Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness
Students are expected to attend every scheduled class meeting and to be on-time. It is the responsibility of the student to obtain any material missed during an absence from his/her classmates. Power Points are not placed in the library and placement on Blackboard will be limited.

Late Work and Make-up Exams
Students will be given a Late Assignment Penalty for tardy work: 10% assignment grade deduction per class day late. However, after the 3rd day, late assignments will not be accepted. In-class late assignments are defined by being turned in after 8:15 am. Please note that class assignments may be sent to me by e-mail or slid under my office door; tardiness is determined by the time noted on the instructor’s Inbox, but allowances can be made for server problems. Files contaminated by viruses, spyware, and worms will not be accepted. DO NOT ASK THE CUSTODIANS to let you into my office to place an assignment on my desk.

Extra Credit
A minimum of ~30 pt extra credit is assured as pre- and post-test assessments. No
**make-ups** are given for pre- and post-tests. Other extra credit assignments may be given at instructor’s prerogative. Instructor is **not obligated** to give make-up assignments for extra credit opportunities, whether excused or unexcused. The ONLY possible exception is for students with a university-approved scheduled absence. The make-up (if given) may not be the exact same assignment given to the class.

**Cell Phone Use**

**DO NOT USE CAMERA PHONES IN LECTURE. DO NOT SEND TEXT MESSAGES DURING CLASS.** Please turn off all cell phones, beepers, Bluetooth devices, Black Berrys, etc., before entering the classroom, or at least place them on silent mode. **I would prefer that earpieces not be worn in lecture. DO NOT TAKE PHOTOS of Power Point slides or videos with your cell phone camera unless otherwise instructed.** Recording of lectures with recorders can only be done with permission of instructor—please see me privately.

**Laptop Use**

I have no problems with any student using a laptop in class, as long as they are not looking at pornography, anime, videos, etc.

**Food in Class**

I prefer that you not eat or drink in class, but I will not throw you out or ask you to leave.

**Missed Exams**

Students have two choices for making up exams due to excused absences. They can do an all-essay make-up exam, or doubling the grade on the final exam. There is no make-up for missed quizzes, or for missed exams due to unexcused absences. Missed extra credit opportunities may or may not be given make-up assignments, depending upon the nature of the assignment. Please note that instructor determines what is not excused. I define excused absences as emergency visits to the ER or physician or dentist; job, graduate and professional school interviews; death of close family members (siblings, in-laws, parents, aunts or uncles, step-parents, grandparents or great-grandparents, first cousins), or University-approved absences as described in the Catalogue and Student Handbook.

**Participation**

I expect that **all members** in the class will participate in the questioning, discussions, and interactions within the lecture. Formal assessment of class participation is not done as part of grade, but I do informally monitor it, and I will note it if you ask me for a letter of recommendation.

**Others**

I will use rubrics to describe how assignments will be graded. These documents have been placed on Blackboard.
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. You (the student) must initiate the paperwork in the Student Services Center (the “Round Building”). 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/) for the last day to drop a course.

  Deadline to drop course with a “W” grade: F July 22
  Deadline to withdraw from University for the summer session: T Aug 2
• **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 (ADA of 1990, including the ADA Amendments from 2008 (PL 110-325), as well as Section 504 of the Rehabilitation Act of 1973. These statutes provide 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.

  This act also includes **returning veterans** who may be experiencing cognitive and/or physical access issues in the classroom or on campus. 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/

  If you need disability accommodations in this class, please contact the instructor as soon as possible. If you have mobility problems, are pregnant, or you may have a history of seizures, please notify the instructor **PRIVATELY** so that assistance can be given in case of fire drills or emergencies. Please have your Faculty Notification Letter from the Disabilities Service Office when you talk with Dr. Buck.

• **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.

If class is cancelled due to a pending hurricane, that information is sent via your islander.tamucc.edu account. It is strongly suggested that students have a functioning islander.tamucc.edu account!! I will also try to send it within Blackboard 9.1, as stated above. I will not send out personal information regarding grades through other types of e-mail servers, only through islander.tamucc.edu. Please make sure this account is working.

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.

• Hints on doing well in course
  This course is considered to be an introduction to graduate school. First, read the syllabus. Second, re-read the syllabus. Third, read the syllabus again.

  Next, read the assigned text chapters. Read the papers assigned. If you have problems reading primary literature, I would suggest that you go to the bookstore and buy Reading Primary Literature: A Practical Guide to Evaluating Research Articles in Biology by Christopher M. Gillen (Pearson/Benjamin-Cummings). The ability to read, analyze, and dissect primary literature should have been learned in Pro Skills.

  This course aims to do higher-level critical thinking, not just memorize the textbook and regurgitate facts. I have taught this course since 2003. Students who have taken it tell me this course was very beneficial in their ability to think critically, and it prepared them for graduate and professional school, and also the workforce if they went into research.

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 in a timely manner during regularly scheduled lecture periods.