Instructor: Dr. Miriam Castillo-Gil – Carver 386 – Phone: 294-8184 – miriamc@iastate.edu, website: http://orion.math.iastate.edu/miriamc/

Office Hours: M,F, 9:00-9:50 am in Carver 385 (Math help room) Also T, 10:00-10:50 am and W, 1:10-2:0 pm in my office Carver 386.

In the event you absolutely can not make it to any of my office hours I am available by appointment. The purpose of the office hour is to go over problems you have trouble with, clarify concepts covered in class and discussing grades.

Lectures: Lecture will be on MT RF@ 11:00-11:50 pm in Pearson 2115.

Course Webpage: All course information and materials will be posted in Blackboard Learn

Course Text: Calculus for the Life Sciences: A Modeling Approach By James L. Cornette and Ralph A. Ackerman. Published and distributed by the Mathematical Association of America. This is an eBook, that you can purchase at http://www.maa.org/ebooks/CLS. The book has a cost of $35, upon purchase you will be able to download a protected PDF file to three computers. iOS (iPad & iPhone) and Android devices can open secure PDFs using the AWReader app (available in the App Store and the Play Store). The iOS app uses the native iPad PDF reader so it is a very basic reader, no frills. Linux is not supported at this time for MAA’s secure PDFs.

Calculators and Other Electronic Devices: You may use any calculator that does not have wireless communication features. Calculators are permitted on all exams; however, the instructor reserves the right to allow calculators during quizzes, depending on its true need during such. Also, whether calculator is allowed or not answers without procedure will result in considerable loss of points. Other electronic devices, such as laptops, iDevices, etc., may be used during lecture for educational purposes only.

Homework: Homework will be assigned with the purpose of students gaining practice and achieve a better understanding of the material. However it will not be graded, it might however be direct source of some quizzes problems. Students should first attempt to complete the homework by themselves before seeking outside help, such as other students and the professor. There is no penalty for students working together, on the contrary it is encouraged that students work in groups for a more engaging experience in the problem solving process.

Exams: There will be 3 in-class exams (Comprising 45 % of the final grade). See tentative dates below. There will be a final exam, which is comprehensive and will count 25% of the final grade. The exams are closed books and closed notes. Exams must be taken during the scheduled times.

Quizzes: There will be 5 Quizzes. Please note that Quiz 5 will take place during Dead Week on Tuesday December 8, 2015. Quizzes will comprise a 25% of the final grade.

1This document is subject to adjustment by the instructors, with notice given to the students.
Participation: Random attendance checks and occasional group work will count towards 5% of the final grade.

Grading Policy: The final grade will be computed as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>25%</td>
</tr>
<tr>
<td>Exams</td>
<td>45%</td>
</tr>
<tr>
<td>Final Exam (Cumulative)</td>
<td>25%</td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

An overall score of 90% or better guarantees at least an A-; 80% or better guarantees at least a B-; 70% or better guarantees at least a C-. These thresholds might be adjusted down at the end of the semester.

Any issues about grading for the exams and quizzes must be addressed within two weeks of the test date. After that time no score changes will be allowed.

Tentative Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Special Event</th>
<th>Sections Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>8/24-8/28</td>
<td></td>
<td>1.1, 1.2, 1.4, 1.5</td>
</tr>
<tr>
<td>W2</td>
<td>8/31-9/4</td>
<td></td>
<td>1.6-1.9</td>
</tr>
<tr>
<td>W3</td>
<td>9/7-9/11</td>
<td>Labor Day (No Class Monday) Quiz 1 (Thursday)</td>
<td>1.10, 2.1, 2.2</td>
</tr>
<tr>
<td>W4</td>
<td>9/14-9/18</td>
<td>Review &amp; Exam 1 (Thursday)</td>
<td>2.3-2.5</td>
</tr>
<tr>
<td>W5</td>
<td>9/21-9/25</td>
<td></td>
<td>2.6-2.8, 3.1</td>
</tr>
<tr>
<td>W6</td>
<td>9/28-10/2</td>
<td>Quiz 2 (Friday)</td>
<td>3.2-3.6</td>
</tr>
<tr>
<td>W7</td>
<td>10/5-10/9</td>
<td>Review &amp; Exam 2 (Thursday)</td>
<td>3.7, 4.1, 4.2</td>
</tr>
<tr>
<td>W8</td>
<td>10/12-10/16</td>
<td>Quiz 3 (Monday)</td>
<td>4.3-4.6</td>
</tr>
<tr>
<td>W9</td>
<td>10/19-10/23</td>
<td></td>
<td>5.1-5.3</td>
</tr>
<tr>
<td>W10</td>
<td>10/26-10/30</td>
<td>Quiz 4 (Monday)</td>
<td>5.4-5.6</td>
</tr>
<tr>
<td>W11</td>
<td>11/2-11/6</td>
<td></td>
<td>6.1-6.3</td>
</tr>
<tr>
<td>W12</td>
<td>11/9-11/13</td>
<td>Review &amp; Exam 3 (Thursday)</td>
<td>7.1, 7.2</td>
</tr>
<tr>
<td>W13</td>
<td>11/16-11/20</td>
<td>Quiz 5 (Monday)</td>
<td>7.3, 7.5, 7.6</td>
</tr>
<tr>
<td>W-</td>
<td>11/23-11/27</td>
<td>Thanksgiving Break</td>
<td>No Classes</td>
</tr>
<tr>
<td>W14</td>
<td>11/30-12/4</td>
<td></td>
<td>8.1-8.4</td>
</tr>
<tr>
<td>W15</td>
<td>12/7-12/11</td>
<td>Dead Week, Quiz 5 (Tuesday 12/8)</td>
<td>Review</td>
</tr>
</tbody>
</table>

Blackboard: Grades and other class materials will be posted in Blackboard.

Accommodations: Please address any special needs or special accommodations with Dr. Castillo-Gil at the beginning of the semester or as soon as you become aware of your needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) form from the Disability Resources (DR) office (515-294-6624). DR is located on the main floor of the Student Services Building, Room 1076. No retroactive accommodations will be provided in this class.
Conduct and Academic Dishonesty: We expect all students to behave in a respectful manner during lecture, and you will be asked to leave the lecture if you are being inappropriate and/or disruptive. For more information, including make up policies, see the Class Policies provided by the Department of Mathematics.

Make up Policies: There will be NO makeup exams/quizzes with the exception of medical emergencies or university approved absences. To allow make up examinations appropriate documentation must be presented. A request must be made in advance to make up the exam to be missed, unless of course, the reason is a last minute emergency (such as an illness, dead in the family, accident, etc.) In these cases contact the instructor as soon as possible. If any of the exams is missed for a reason other than the listed as legitimate excuses (as per university policies) there will be no make up allowed, such as personal trips, job interviews, sleeping-in, etc.

Extra Credit: Occasionally there might be a possibility to earn extra credit on the exams and/or quizzes. Extra credit will not be assigned on an individual basis; and most importantly, no extra credit assignments will be available upon request at the end of the semester to improve grades. Students will NOT be given the opportunity to complete old assignments at the end of the semester to improve their grades.

Course Objectives: The specific Learning objectives of the course is listed below.

Mathematical Models of Biological Processes
• Be able to build a mathematical model from experimental data of bacterial growth.
• Be able to solve the difference equation $P_{t+1} - P_t = rP_t$
• State the definitions of Doubling time and Half-life
• Build a model for Mold Growth with quadratic solutions.
• Be able to solve the difference equation $P_{t+1} - P_t = rP_t + b$

Functions as Descriptions of Biological Patterns
• Be able to identify functions as simple graphs
• Recognize function notation
• Describe and identify polynomial functions
• Be able to apply the method of Least squares to fit polynomials to data
• Be able to make arithmetic combinations of functions
• State the definition of the inverse function
• Be able to evaluate composition of functions
• State the definition of periodic functions, in particular trigonometric functions

The Derivative
• Be able to find the equation of the tangent to the graph of a function
• State and work with the definition of limit and rate of change as a limit
• Be able to solve mathematical models using the derivative
• Be able to find the derivatives of polynomials
• Be able to find the second derivative and higher order derivatives
• Explain and work with limits involving infinity

Continuity and the Power Chain Rule
• State the definition of continuity
• Be able to apply the generalized power rule
• Be able to solve applications of the power chain rule
• Be able to find a derivative using Implicit differentiation
Derivatives of Exponential and Logarithmic Functions
- Determine the derivative of exponential functions
- State and work with the definition of the number e
- State and work with the definition of the natural logarithm
- Determine the derivative of $e^{kt}$
- Be able to apply the chain rule to exponential and logarithmic functions.
- Be able to solve the derivative equation $P'(t) = kP(t)$

Derivatives of Products, Quotients and Composition of Functions
- Determine derivatives of products and quotients
- State and work with the chain rule
- Determine the derivatives of inverse functions

Derivatives of the Trigonometric Functions
- State the definition of Radian Measure
- Determine the derivatives of trigonometric functions
- Be able to apply the chain rule to trigonometric functions
- Apply trigonometric functions to describe examples of periodic processes

Applications of Derivatives
- Identify and describe the geometry of the derivative
- Be able to apply the second derivative test to determine if an critical value is a maximum or a minimum.
- Be able to solve related rates problems using the derivative.
- Be able to solve optimization problems using the derivative.