SYLLABUS

TEXAS A&M UNIVERSITY

Math 148 - Spring 2018

Instructor: Heather Ramsey

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Office: Blocker 221A and 241B

Office hours: Tues 12:30-1:30pm (BLOC 628),

Wed 2:45-4:30pm (BLOC 202)

Class Times, Locations, and Teaching Assistants:

Section	Days	Time	Location	TA
501, 502, 503 Lecture	MWF	10:20am-11:10am	RICH 114	
501 Recitation	TR	8:00am-8:50am	BLOC 163	John Weeks
502 Recitation	TR	3:55pm-4:45pm	BLOC 121	John Weeks
503 Recitation	TR	5:30pm-6:20pm	BLOC 164	John Weeks
504, 505, 506 Lecture	MWF	11:30-12:20pm	RICH 114	
504 Recitation	TR	2:20pm-3:10pm	BLOC 161	Tekin Karadag
505 Recitation	TR	3:55pm-4:45pm	BLOC 148	Tekin Karadag
506 Recitation	TR	5:30pm-6:20pm	BLOC 161	Tekin Karadag

Required Text: *Calculus for Biology and Medicine*, Third Edition, by Claudia Neuhauser, Pearson (2010). ISBN-13: 9780321644688

Required Materials: Pencils and printed copies of the lecture notes that are available in eCampus are required to be brought to class every day.

Recommended Materials: A non-graphing scientific calculator with no calculus capabilities is highly recommended. A good option is the TI-30XS Multiview calculator. A folder to organize your lecture notes and a notebook to organize your written solutions to homework problems are also recommended.

Catalog Title and Description: (CREDIT 4.0) *Calculus II for Biological Sciences* - Introduction to integral calculus in a context that emphasizes applications in the biological sciences; ordinary differential equations and analytical geometry. Prerequisite: MATH 147 or approval of instructor. **Credit will not be given for more than one of MATH 148, MATH 152 and MATH 172.**

Learning Outcomes: This course is focused on quantitative literacy in mathematics with an emphasis on real world applications, especially to the biological sciences. Upon successful completion of this course, students will be able to

- apply techniques for integration, including integration by parts and partial fraction decomposition.

- identify and compute improper integrals using limits.

- justify why an improper integral converges or diverges by applying the comparison theorem.

- approximate functions with Taylor polynomials and evaluate the error in the approximation by using the Taylor inequality.

- solve separable ordinary differential equations.

- understand how exponential population growth is modeled by a constant per capita growth rate while logistic population growth incorporates density dependence.

- find equilibria of differential equations and analyze their stability both graphically and by using the stability criterion.

- apply various techniques for solving systems of equations, including Gaussian elimination.

- apply basic matrix algebra skills including addition, subtraction, scalar multiplication, and multiplication of matrices and find the inverse of a matrix and be able to use matrix algebra to solve problems.

- compute and interpret eigenvalues and eigenvectors for 2×2 matrices.

- use matrices in biological applications, including the study of age-structured populations.

- interpret 2×2 linear maps applied to 2×1 vectors.

- add, subtract, and scale vectors and compute dot products.

- use vectors in applications, including finding equations of lines and planes.

- understand concepts of limits and continuity for multivariable functions.

- use partial derivatives and linear approximations for solving real-world problems.

- understand and explain the concepts of equilibria and stability for biological systems of difference equations.

- correctly solve applied problems, and write the solutions in a coherent fashion.

- construct and analyze linear and nonlinear systems of differential equations applied in biology and medicine.

Core Objectives
Critical Thinking
The following critical thinking skills will be assessed on exams and other assignments. Students will:

- Analyze integrals and determine the proper technique for integration, including the integration by parts and partial fraction decomposition methods.

- Identify and compute improper integrals using limits.

- Approximate functions with Taylor polynomials and evaluate the error in the approximation by using the Taylor inequality.

- Solve separable ordinary differential equations.

- Find equilibria of differential equations and analyze their stability both graphically and by using the stability criterion.

- Apply techniques for solving systems of equations, including Gaussian elimination.

- Learn basic matrix algebra skills including addition, subtraction, scalar multiplication, and multiplication of matrices and be able to find the inverse of a matrix.

- Creatively apply matrix algebra to solve systems of equations.

- Compute and interpret eigenvalues and eigenvectors for 2×2 matrices.

- Understand and apply concepts of limits and continuity for multivariable functions.

- Compute partial derivatives and linear approximations to solve real-world problems.

- Compute equilibria and analyze their stability for biological systems of difference equations.

- Solve applied problems, and write the solutions in a coherent fashion.

- Analyze and construct linear and nonlinear systems of differential equations applied in biology and medicine.

Communication Skills

The following communication skills will be assessed on exams, during lecture, and on other assignments. Students will:

- Justify why an improper integral converges or diverges by applying the comparison theorem.

- Understand how exponential population growth is modeled by a constant per capita growth rate while logistic population growth incorporates density dependence.

- Find equilibria of differential equations and analyze their stability both graphically and by using the stability criterion.

- Apply basic matrix algebra skills including addition, subtraction, scalar multiplication, and multiplication of matrices and finding the inverse of a matrix to solving problems.

- Interpret the action of 2×2 linear maps applied to 2×1 vectors both graphically and numerically.

- Add, subtract, and scale vectors and compute dot products.

- Use vectors in applications, including finding equations of lines and planes.

- Solve applied problems, and write the solutions in a coherent fashion.

- Construct and analyze linear and nonlinear systems of differential equations applied in biology and medicine.

Empirical and Quantitative Skills

The following empirical and quantitative skills will be assessed on exams and other assignments. Students will:

- Apply techniques for integration, including integration by parts and partial fraction decomposition.

- Solve separable ordinary differential equations.

- Find equilibria of differential equations and analyze their stability both graphically and by using the stability criterion.

- Compute and interpret eigenvalues and eigenvectors for 2×2 matrices.

- Compute the Leslie matrix associated with a given data set pertaining to an age-structured population and use it to make predictions of population sizes for future generations.

- Use partial derivatives and linear approximations for solving real-world problems.

- Compute equilibria and analyze their stability for biological systems of difference equations.

- Manipulate given information to construct and analyze linear and nonlinear systems of differential equations applied in biology and medicine.

Email Policy: Check your **TAMU** email account and eCampus EVERY day. You are responsible for any information I post in eCampus and send through email. If you send an email to me, be sure to include your full name and section number in the message. NOTE: Because of privacy rights, I cannot discuss grades via email or over the phone.

Cell Phone/Laptop Computer Policy: As a courtesy to me and your classmates, and to improve student participation and reduce distractions, all cell phones and laptop computers (and other electronic devices) must be OFF and put away during lecture. You will be expected to take lecture notes with pencil and paper only. If you disrupt class or distract your neighbor **or distract me** with your cell phone or other electronic device, you may be asked to leave class.

Grading Policy: Grades will be calculated according to the following percentages (rounded to the nearest whole number):

Three Exams	18% each	A = 90-100%
Quizzes	15%	B = 80-89%
Recitation Assignments	8%	C = 70-79%
Comprehensive Final Exam	23%	D = 60-69%
		F = below 60%

Note: Any questions regarding grading/scoring must be made **within one week** of the return of the exam or quiz or no change in the grade will be made.

Midterm Exams: There will be three midterm exams administered on the dates listed below.

Exam 1: February 15 & 16, 2018
Exam 2: March 22 & 23, 2018
Exam 3: April 19 & 20, 2018

Students with verified disabilities can make arrangements for the exam to be administered by the Office of Support Services for Students with Disabilities.

Midterm Exam Format: Each midterm exam will consist of two parts: multiple choice (no partial credit) and work out (partial credit possible). The multiple choice part of the exam will be administered during recitation sessions (Thursdays). The work out part of the exam will be administered during lecture (Fridays). Both parts of each exam are closed book. Students are not allowed to use notes, formula sheets, books,

or electronic devices, with one exception–an approved non-graphing scientific calculator with no calculus capabilities may be used for all parts of all exams. Students need to bring a No. 2 pencil and their TAMU student ID to each part of each exam.

Final Exam Format and Dates: The final exam will be a 25-question multiple choice exam. No partial credit will be given.

Final Exam for Sections 501-503: Monday, May 7, 2018, 8am-10am
Final Exam for Sections 504-506: Tuesday, May 8, 2018, 10:30am-12:30pm

Attendance and Make-up Policies: Attendance five days per week, with the exception of holidays of course, is mandatory and may affect your grade. No make-up recitation assignments, quizzes, or exams will be given without an official, written, University Excuse (falsification of documentation is a violation of the Aggie Honor Code).

You must notify me (ramsey@math.tamu.edu) for exams or your TA (John Weeks: jweeks03@tamu.edu; Tekin Karadag: tekinkaradag@math.tamu.edu) for recitation assignments and quizzes **in advance** to ensure the right to a make-up. If advance notice is not possible (i.e. sudden illness), you MUST contact me or your TA, as appropriate, within TWO working days of the missed exam/assignment/quiz; otherwise, you forfeit the right to a make-up.

An absence for a non-acute medical service or regular check-up does not constitute an excused absence. For more information please go to http://student-rules.tamu.edu/rule07. Please note that I will NOT accept the Explanatory Statement for Absence from Class form as sufficient written documentation of an excused absence.

Your teaching assistant will coordinate with you for making up a recitation assignment or quiz. If you have a University approved absence for missing an exam, you will be expected to make up your exam according to the Math Department. Make-up Schedule that can be found at

http://www.math.tamu.edu/courses/makeupexams.html

starting with the first option for each exam. Only if you have a University approved absence for the day of the exam and the previous makeup day will you be allowed to use the later options or have other arrangements made. You must discuss (email is fine) the need for a make-up exam with me before going to a scheduled time.

Quizzes: Announced and unannounced quizzes and will be given throughout the semester during Thursday recitations and possibly during lecture. Each quiz will be graded on a 10-point scale, and **no make-up quizzes will be given without written verification of a University excused absence.** One quiz grade will be dropped.

Recitation Assignments: A set of problems will be assigned during recitation each Tuesday and will be due during that class period. Students may work on these problems in groups of up to three. **No make-ups for recitation assignments will be given without written verification of a University excused absence.** One recitation assignment grade will be dropped.

Homework Assignments: Homework assignments will be posted in eCampus. These assignments will not be collected for a grade, but completing them is essential to doing well in the course. I will be writing exams and quizzes with the assumption that you have worked all assigned homework problems.

Calculator Policy: Students will be allowed to use **a scientific calculator with no calculus capabilities** on all quizzes and exams. No graphing calculators, cell phone calculators, or any other electronic device will be allowed. The **TI-30XS Multiview** is highly recommended.

Scholastic Dishonesty: You are encouraged to work together on the homework assignments, but do not copy another student's work. Copying work done by others, either in class or out of class, is an act of scholastic dishonesty and will be prosecuted to the full extent allowed by University policy.

During recitation, you will be allowed to work in groups of up to three students. All group members are expected to contribute to the assignment. If the teaching assistant finds that one or more members of a group are not participating, and if this is a first offence, then all members of the group will be asked to work individually for the rest of the period and submit individual assignments. If this happens on a subsequent assignment, **ALL** members of the group will be submitted to the Aggie Honor Office for scholastic dishonesty. For example, if the name of a student who was absent appears on that day's recitation assignment, ALL students in that group will receive a 0 on the assignment and be reported to the Aggie Honor Office.

Using an unauthorized calculator during an exam or quiz will result in a zero on the assignment. Also, cell phone use during an exam, quiz, or recitation assignment will result in a zero on the assignment.

Always abide by the Aggie Code of Honor: *An Aggie does not lie, cheat, or steal or tolerate those who do.* Please refer to Honor Council Rules and Procedures at http://www.tamu.edu/aggiehonor for more information on academic integrity and scholastic dishonesty. **I have served as a member of the Aggie Honor Council, so I take these matters very seriously.**

Extra Help and Preparing for Exams:

- **Your Instructor:** I want each and every one of my students to be successful in this class. Please feel free to ask questions in class. If you need more help, come by my office during office hours or make an appointment to see me. Remember, I am here to help, but I cannot do that if I don't know that there is a problem.

- **Recitation and TA:** You will attend recitation with a teaching assistant twice per week. During these class periods, you will be able to ask the TA to explain homework problems and review any topics from lecture, so be sure to take advantage of this class time.

- **Your Classmates:** Get to know your classmates. Form study groups and work on homework problems outside of class.

- **Practice:** Working ALL of the homework problems from your textbook is essential to doing well in this course. If you struggle with these problems the first time you work them, be sure to work them again AND work other problems from the textbook that are similar. I strongly recommend that you practice problems **DAILY**.

- **Dr. Glenn Lahodny's Math 148 Web Page:** Dr. Lahodny has very generously offered his course materials for our use. He has practice problems for each exam, along with blank copies of his lecture notes, posted at

  http://www.math.tamu.edu/ glahodny/Math148/Spring2017/

Americans with Disabilities Act (ADA) 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 contact Disability Services, currently located in the Disability Services Building at the Student Services at White Creek complex on West Campus, or call 979-845-1637. For additional information, please visit http://disability.tamu.edu.

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Weekly Lecture Schedule: Roughly speaking, we should cover the following material from the textbook by Neuhauser on the following schedule:

Week of Monday	Sections Covered		Week of Monday	Sections Covered
Jan. 15	7.2, 7.3		Mar. 19	10.4
Jan. 22	7.3, 7.4, 7.6		Mar. 26	10.5.1, 10.6.1
Jan. 29	7.6, 8.1		Apr. 2	10.6.1, 10.7
Feb. 5	8.1, 8.2		Apr. 9	11.1, 11.2
Feb. 12	9.1		Apr. 16	11.3
Feb. 19	9.2, 9.3		Apr. 23	11.4
Feb. 26	9.4, 10.1, 10.2		Apr. 30	Review
Mar. 5	10.2, 10.3			