

Calculus for biological sciences II – Math 247
Syllabus and guidelines 2017

Instructor: Victor Ostrik; office Deady 10B,
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Class meets: MTWTF 1:00-1:50, Straub 252.

Office hours: MW 10:00-11am (or by appointment), Deady 10B.

Text: *Calculus for the Life Sciences*, by Frederick Adler. We will cover chapters 4 and 5.

Class webpage:

<http://pages.uoregon.edu/vostrik/math247winter17/index247.html>

Exams: There will be 2 midterms at the end of week 4, and at the end of week 8. There will be a two hour final exam at the time scheduled by the registrar's final exam calendar.

Quizzes: We will also have 3-4 quizzes (usually on Fridays).

Problem Sets: There will be (mostly) weekly homework assignments, Homework will usually be due on Wednesday. We will usually devote Tuesdays to problem solving.

Grades: Each hour exam will count as 20% of your grade, the total homework will count as 15% of your grade, the total quizzes will count as 15%, and the final exam will count for 30%.

Learning Outcomes: in this class we will learn how to

- find the family of antiderivatives (if possible) for a continuous function;
- approximate definite integrals using Riemann sums;
- use substitution and integration by parts to compute indefinite and definite integrals;
- compute and interpret definite integrals with finite and infinite limits of integration;
- set up single and coupled differential equations based on written descriptions including predator/prey models, population ecology, competitive selection, and chemical exchange across a membrane;
- solve certain pure-time, autonomous, and non-autonomous differential equations using integration and separation of variables;
- find and determine the stability of equilibria in autonomous differential equations; draw relevant phaseline diagrams;

- sketch solutions to single and coupled differential equations from an initial condition;
- verify solutions to, and use Eulers method with, differential equations in two dependent variables;
- use nullclines and find equilibria of systems of differential equations in two dependent variables;
- sketch phase-plane trajectories for systems of differential equations.

Guidelines: It is extremely important to study the relevant part of the text *before* the related lecture. This will make lectures easier to understand and give you a chance to ask questions that come up reading the text.

Doing the homework seriously is the most important thing you can do to succeed in this course. Start early, and do some every day. I encourage you to work together on homework, as long as the work you do is really your own.

Please do ask questions about the homework, or any other aspect of the course in class. I will always be happy to spend the first few minutes of class dealing with homework questions, or questions from previous lectures, so come prepared! In order to ask questions effectively, make notes to yourself as you review lectures (and discover points that are unclear to you), as you study the text (and notice things that you are not sure you understand), and as you work on homework and come to problems you have trouble with.

Approximate Schedule

- Week 1:** Differential equations and antiderivatives. 4.1-4.2.
- Week 2:** Integration: how to compute antiderivatives. 4.3-4.4.
- Week 3:** Definite integrals. Applications of integrals. 4.5-4.6.
- Week 4:** Improper integrals. 4.7. Midterm I.
- Week 5:** More complicated (and interesting) differential equations. 5.1-5.2.
- Week 6:** Autonomous differential equations. 5.3-5.4.
- Week 7:** Differential equations in dimension 2. 5.5-5.6.
- Week 8:** Solving differential equations graphically or approximately. 5.7. Midterm II.
- Week 9:** The dynamics of a neuron. 5.8.
- Week 10:** Review.
- Week 11:** Final exam on Monday, March 20, 14:45-16:45.