MATHEMATICS 442/551 A01 FALL 2015 COURSE OUTLINE

Department of Mathematics and Statistics, University of Victoria

Instructor	Dr. Slim Ibrahim (ibrahims@uvic.ca)
Office	DTB A547, (250) 853-3294
Office Hours	Tue 12:30 – 1:30, Wed 11:30 – 12:30, or by appointment
Lectures	Tue, Wed, Fri 10:30 – 11:20, CLE C109
Course website	UVic CourseSpaces (log in to UVic and find under "My Online Tools")

TEXT   F. Verhulst. *Nonlinear Differential Equations and Dynamical Systems (2nd Ed.).* The Bookstore and SUBtext might have used copies available.

PREREQUISITE   Math 300 and Math 342, or with departmental approval.

TOPICS

Chapter 1:	Existence and uniqueness, Gronwall's inequality
Chapter 2:	First integrals, Evolution of a volume, Liouville's theorem
Chapter 4:	Periodic solutions
Chapter 6:	Linear equations (asymptoticlly autonomous, periodic)
Chapter 7:	Stability by linearization
Chapter 8:	Stability by the direct method
Chapter 9:	Perturbation
Chapter 10:	The Poincaré-Lindstedt method
Chapter 11:	Averaging
Chapter 13:	Bifurcation
Chapter 14:	Chaos (time permits!)

ASSIGNMENTS   There will be **five to six** assignments. They will be posted on Moodle at least one week before the due date. See the course schedule below for approximate due dates. The exact due dates will be announced in class, written on the assignment and posted on Moodle.

ASSIGNED PROJECTS (required for Graduate Students:)   Graduate Students (i.e. enrolled in Math 551) will be required to do a class project. The undergraduates are welcome to choose this option but it is not mandatory for them (see grading below). In the middle of the term or so, a list of project topics will be made available and each concerned student will be asked to choose her/his project from the list. They have to produce a paper (about 5 to 10 pages of taped text with a reasonable font size) and make a short presentation of about 15 minutes in front of the class, at the end of the semester.

MIDTERM   There will be **one in class midterm** on Friday Oct 23. If you have a legitimate reason for missing a midterm, with documentation, please contact your instructor. There will be **no** make-up midterms.

FINAL EXAM A three hour final examination will be scheduled by the University during the final exam period.

Off-schedule Final Examinations are not given except in accordance with the regulations on *Illness, Accident or Family Affliction at Exam Time* in the U.Vic. Calendar. Deferred status is granted only for Final Examinations. Students are **strongly** advised **NOT** to make final plans for travel or employment during the examination period since special arrangements will **NOT** be made for examinations that may conflict with such plans. Please note that low cost airline tickets, family reunions, weddings and vacations definitely DO NOT fall under the Calendar regulations for obtaining a deferred final examination.

HOW TO SUCCEED Mathematics is very much a skill that is learned hands-on, by doing problems, *not* merely by reading a book, memorization of techniques, browsing the internet or sitting in lectures. You should expect that the bulk of your learning will come when struggling with homework problems, and by attempting as many of the suggested problems as possible. Of course, your learning can be supplemented by all the above activities (with as little memorization as possible, I would hope). In that regard I encourage you to talk with your fellow students about the mathematics you are thinking about. For *your* benefit, please ensure that it is you who has solved your homework problems. The less time you spend thinking about problems, the less the nature of mathematics sinks into your brain, and the more likely it is that you will do poorly on exams. Since mathematics is an extremely cumulative subject anything you do *not* learn in this course will become a difficulty for you in subsequent courses. You should view the lecture as a first approach to the topics you will truly be diving into in your homework assignments.

MARKING SCHEME Your final percentage grade will be computed according to the following scheme.

- **Undergraduate Students** Midterm 30%; assignments weigh 30%; final examination 40%.

- **Graduate Students** Midterm 20%; assignments weigh 20%; project 20%; final examination 40%.

You must pass the final exam to pass the course.
The following scale is used to convert scores to final grades.

90–100	85–89	80–84	77–79	73–76	70–72	65–69	60–64	50–59	0–49
A+	A	A–	B+	B	B–	C+	C	D	F

TENTATIVE COURSE SCHEDULE

Week	Date	Sections	Assignments due
1	Sep 9, 11	Introduction, 1.2	
2	Sep 15, 16, 18	1.3, 2.1, 2.4	
3	Sep 22, 23, <u>25</u>	2.5, 4.1–4.3	Assignment #1
4	Sep 29, 30, Oct 2	4.4, 4.5, 6.2	
5	Oct 6, 7, <u>9</u>	6.3, 7.1, 7.2	Assignment #2
6	Oct 13, 14, 16	7.3, 8.2, 8.3	
7	Oct 20, 21	8.4, 9.1	
	Oct <u>23</u>	**Midterm**	Assignment #3
8	Oct 27, 28, 30	9.2–9.4	
9	Nov 3, 4, <u>6</u>	10.1–10.3	Assignment #4
10	Nov 13	10.4, **reading break**	
11	Nov 17, 18	11.1–11.3	
	Nov <u>20</u>	11.4	Assignment #5
12	Nov 24, 25, 27	13.1–13.5	
13	Dec 1, 2, <u>4</u>	13.5, 14.1, 14.4, 14.5	Assignment #6

Tentative assignment due dates are <u>underlined</u>.