

## COURSE OUTLINE

### MATH 204: Calculus IV

#### Instructor

**Lecturer** Seth Chart

**Research Area** Ergodic Theory and Dynamical Systems

**Email** schart@uvic.ca<sup>1</sup>

**Office** David Turpin Building A455

#### General Course Information

**Number of Units** 1.5

Credit will be granted for only one of MATH 204 or MATH 300. Not open for registration to students with credit in MATH 201.

**Pre-requisites** Math 200 or Math 205

#### Office Hours and Assistance

**Monday** 2:00 pm to 4:00 pm, DTB A455

**Thursday** 2:00 pm to 4:00 pm, DTB A455

or By appointment (send email to book one)

**Other Help** The Mathematics & Statistics Assistance Centre is a large space where students can go to work, on their own or in groups, and to discuss math & stats problems. The Centre is staffed with talented Teaching Assistants who are happy to discuss primarily first and second year course material with you. Please see <http://www.math.uvic.ca/~msassist/index.html> for more information.

**Math Club** Students in Undergraduate Mathematics and Statistics (SUMS) was founded in 2014 as the reincarnation of a previous undergraduate course union that had been inactive for a few years. Please see <http://www.uvic.ca/science/math-statistics/undergraduate/sums/index.php> for more information.

#### Learning Objectives

In this course we will strive to:

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<sup>1</sup>Please use the CourseSpaces forum for all questions that are not private.



- Become familiar with the basic objects of vector calculus and differential equations: vector fields, slope fields, differential equations, the Laplace transform, power series, and Fourier series.
- Become proficient with the standard computations of vector calculus and differential equations: Computation of line integrals, flux of a vector field through a surface, flux through a simple closed curve, circulation of a vector field, solutions to separable differential equations, solutions to exact equations, solutions to linear differential equations, Laplace transforms of differential equations, series solutions to differential equations.
- Become comfortable thinking about a problem in terms of vector fields and differential equations.
- Become adept at translating empirical problems into the language of vector calculus and differential equations, and interpreting solutions in the empirical context.
- Become familiar with the application of the fundamental theorems of vector calculus and differential equations: Green's theorem, Stoke's theorem, Gauss's law, existence and uniqueness theorems for differential equations.

## Topics Covered

**Vector Calculus** line integrals, vector fields, work, circulation, flux, path independence, conservative fields, potential functions, Greens Theorem in the plane, surface area, surface integrals, Stokes's Theorem, The Divergence Theorem, Generalized Stokes's Theorem.

**Differential Equations** separable equations, linear first order equations, exact equations, equilibrium solutions and stability, linear second order equations, general solution to linear equations, homogeneous equations, non-homogeneous equations, method of undetermined coefficients, Laplace transform methods, power series solutions near ordinary points, Fourier series solutions to separable partial differential equations.

## Course Material and Online Resources

**Textbooks** (both are required)

- *Calculus: Early Transcendentals, 13th Edition* by Thomas;
- *Differential Equations and Boundary Value Problems* by Edwards and Penney.<sup>2</sup>

**Course webpage** Go to <https://CourseSpaces.uvic.ca> and access **201605 MATH 204 A01**.

**Calculator** The only acceptable calculators are the Sharp EL-510R or the Sharp EL-510RNB. They may be purchased at the UVic Bookstore or elsewhere for about \$12. A calculator is permitted in this course.

<sup>2</sup>Custom edition for University of Victoria, 2015. Bookstore or SUBtext may have used copies.



## Class Meetings

**Lectures** will be held in David Turpin Building room A120 on Mondays and Thursdays from 10:00 am to 11:20 pm. Our first lecture will be on Monday May 2. Please see the course schedule for more information.

**Tutorial section T01** will meet in Clearihue Building room A127 on Fridays from 1:30 pm to 2:20 pm. The first tutorial will be held on Friday May 13.

**Tutorial section T02** will meet in Clearihue Building room A127 on Fridays from 2:30 pm to 3:20 pm. The first tutorial will be held on Friday May 13.

## Evaluation and Grading

**Homework** There will be six homework assignments. Assignments must be submitted at the beginning of lecture on the dates indicated in the course schedule. Your lowest assignment score will be dropped. In addition to the graded assignments you are expected to work the required exercises from the book listed below.

**Midterms** There will be two midterm exams. Midterms will be held in your tutorial section on May 27 and June 24.

**Final Exam** The final exam will be held during the exam period August 2 to 16. The date and location of the final will be determined by the university later in the semester.

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

Homework Assignments	Midterms	Final Exam
10%	40%	50%

Each week we will have approximately three hours of lecture and one hour of tutorial work. In addition to this you are expected to spend eight to twelve hours working on the course, this includes reading the textbook, working practice problems, working on assignments, reviewing lecture notes, reviewing tutorial problems, attending office hours, and making use of the math assistance center.

**Accessibility** Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the Resource Centre for Students with a Disability (RCSD) as soon as possible. The RCSD staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations <http://rcsd.uvic.ca/>. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

**Grading** Percentage scores will be converted to letter grades according to the university-wide standard table (<http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/Grad.html>).



**Final Examination** Off-schedule final examinations (i.e., deferred examinations) are given only in accordance with the university policy as outlined in the Calendar. If you are unable to write a final examination due to illness, accident or family affliction, please refer to the following webpages for detailed instructions how to proceed: <http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/AcCo.html> and <http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/DeSt.html>.

Students are **strongly advised not to make plans for travel or employment during the final examination period** as special arrangements will not be made for examinations that conflict with such plans.

**Supplemental Examinations.** The Department of Mathematics and Statistics does not award 'E' grades or offer Supplemental Examinations in any of its courses.

## Policies and Ethics

**Attendance** The university Calendar states 'Students are expected to attend all classes in which they are enrolled.' (see <http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/AcCo.html>). Our courses are conducted on that basis. If you miss an announcement (information concerning midterms, corrections to assignment, etc.) because you did not attend class, you must accept the consequences of not having learned of the change.

**Guidelines on Religious Observances** Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.

**Missing work** Homework assignments will not be accepted after the due date for any reason. Your lowest assignment mark will be dropped when final grades are computed. If you are unable to submit an assignment due to illness or other excused absence, then this will be the assignment that is dropped. Make up examinations will not be offered for midterm exams. If you are unable to write one of the midterm exams because of an excused absence, then you will receive a score corresponding to your course rank.

**Academic Integrity** Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offenses.

### **The responsibility of the institution**

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage



through cheating on essays, exams, and projects.

**The responsibility of the student**

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension.

It is your responsibility to understand the Universitys policy on academic integrity: <http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/PoAcI.html>

## How to Succeed in This Course

In order to succeed in this course you should:

- Prepare for each lecture by previewing the sections indicated in the course schedule, you should read through definitions and examples and take notes on any questions that you have about the material.
- Attend all lectures and tutorials. Ask the questions that you noted while previewing the sections for the day in lecture.
- You should work all required exercises from the book. When you find exercises that you cannot complete on your own you should seek help in office hours, the math assistance center, tutorials, lecture, or on the CourseSpaces forum.
- You should work assignments as far in advance of the due date as possible, if you have questions regarding the assignment please ask them during office hours.
- When your assignments are returned you should rework any exercises that you did not receive full credit for and review similar problems. If you are unsure how to solve a problem that you did not solve correctly, then you should visit office hours.
- It is important to study for exams starting several days prior to the date of the exam.



## Course Schedule (Dates are approximate)

Week	Date	Event	Section	Due
1	May 02	Lecture 1	T 16.5, 16.6	
	May 05	Lecture 2	T 16.1, 16.2	
	May 06	<i>No Tutorial</i>		
2	May 09	Lecture 3	T 16.2, 16.3	
	May 12	Lecture 4	T 16.3, 16.4	
	May 13	Tutorial 1		
3	May 16	Lecture 5	T 16.7, 16.8	HW 1
	May 19	Lecture 6	T 16.8, 14.9	
	May 20	Tutorial 2		
4	May 23	<i>Victoria Day</i>		
	May 26	Lecture 7	EP 1.1, 1.2	HW 2
	May 27	<b>Midterm 1</b>		
5	May 30	Lecture 8	EP 1.3	
	June 02	Lecture 9	EP 1.4, 1.5	
	June 03	Tutorial 3		
6	June 06	Lecture 10	EP 1.6	HW 3
	June 09	Lecture 11	EP 2.1, 2.2	
	June 10	Tutorial 4		
7	June 13	Lecture 12	EP 3.1	
	June 16	Lecture 13	EP 3.2	
	June 17	Tutorial 5		
8	June 20	Lecture 14	EP 3.3, 3.4	HW 4
	June 23	Lecture 15	EP 3.5	
	June 24	<b>Midterm 2</b>		
9	June 27	Lecture 16	EP 3.6, 3.8	
	June 30	<i>Reading Break</i>		
	July 01	<i>Reading Break</i>		
10	July 04	Lecture 17	EP 4.1	HW 5
	July 07	Lecture 18	EP 4.2, 4.3	
	July 08	Tutorial 6		
11	July 11	Lecture 19	EP 4.4	
	July 14	Lecture 20	EP 4.5, 4.6	
	July 15	Tutorial 7		
12	July 18	Lecture 21	EP 5.1, 5.2	HW 6
	July 21	Lecture 22	EP 6.1, 6.2	
	July 22	Tutorial 8		
13	July 25	Lecture 23	EP 6.3	
	July 28	Lecture 24	EP 6.4, 6.5	
	July 29	Tutorial 9		
14-15	August 2-16	Final Exam		



## Required Exercises (subject to change)

Book	Section	Exercises
Thomas	16.1	11, 13, 15, 19, 23, 27, 33, 34, 37.
Thomas	16.2	3, 9, 21, 23, 24, 27, 29.
Thomas	16.3	1, 3, 5, 7, 9, 19, 29.
Thomas	16.4	19, 21, 23, 27, 31.
Thomas	16.5	1, 7, 9, 17, 19, 21.
Thomas	16.6	1, 3, 5, 19, 21, 23, 29, 37.
Thomas	16.7	2, 5, 7, 9.
Thomas	16.8	5, 7, 9, 13.
Thomas	14.9	3, 5, 7, 11.
Edwards & Penney	1.1	5, 7, 11, 16, 18, 25, 27, 35, 43.
Edwards & Penney	1.2	2, 6, 9, 10, 17, 26, 29.
Edwards & Penney	1.3	11, 13, 15, 27.
Edwards & Penney	1.4	4, 5, 13, 21, 23, 34, 36.
Edwards & Penney	1.5	3, 9, 16, 19, 27, 33, 36.
Edwards & Penney	1.6	3, 8, 16, 24, 32, 35, 44, 50.
Edwards & Penney	2.1	1, 3, 10, 12, 15, 16.
Edwards & Penney	2.2	1, 2, 4, 8, 9, 11, 21, 22.
Edwards & Penney	3.1	11, 13, 16, 19, 21, 24, 27, 28, 38, 39.
Edwards & Penney	3.2	1, 4, 9, 13, 18, 19, 21, 23.
Edwards & Penney	3.3	3, 5, 9, 12, 15, 16, 23, 24.
Edwards & Penney	3.4	1, 3, 5, 6, 13, 15, 17, 18.
Edwards & Penney	3.5	2, 3, 4, 8, 9, 20, 25, 27, 53, 55, 56.
Edwards & Penney	3.6	1, 2, 7, 10, 12, 14, 19.
Edwards & Penney	3.8	1, 2, 3, 4, 5, 15, 16, 17, 18.
Edwards & Penney	4.1	1, 5, 6, 7, 9, 13, 16, 23, 28, 30.
Edwards & Penney	4.2	1, 5, 7, 10, 17, 20, 21, 24.
Edwards & Penney	4.3	2, 3, 5, 6, 7, 9, 12, 14, 15, 27, 29.
Edwards & Penney	4.4	8, 12, 13, 16, 20, 21, 23.
Edwards & Penney	4.5	1, 2, 11, 13, 26.
Edwards & Penney	4.6	1, 2, 4, 9, 10, 12.
Edwards & Penney	5.2	1, 3, 7, 16, 17, 23, 24.
Edwards & Penney	6.1	1, 3, 5, 7, 9, 11, 13, 15, 21, 22, 25.
Edwards & Penney	6.2	1, 7, 9, 12, 18, 19, 20.
Edwards & Penney	6.3	11, 12, 13, 14, 19.
Edwards & Penney	6.4	7, 9, 11, 13, 15, 17.
Edwards & Penney	6.5	1, 3, 5, 7, 9, 13, 17.