COURSE: MATH 200 CALCULUS III

CREDITS: 3

TERM: 2019 WT1

PREREQUISITES: MATH 101

Welcome to MATH 200! This is a copy of the common canvas site for all nine sections of MATH 200 in Term 1 of the 2019W session (September to December 2018) where you will find all the information you need for the course. Section specific information and materials can be found in the **INDIVIDUAL SECTION MODULES** within this canvas site, be sure to check these regularly for updates.

Your grade in the course will be determined by your grades in

- weekly webwork assignments (worth 10% of overall grade) see below for schedule/dates.
- 4 in class Tests (worth 35% of overall grade) see below for schedule/dates.
- 1 final exam (worth 55% of overall grade)

All the basic information on these can be found below. The tests will be held during regular class time. It is your own responsibility to also check your own sections module (within this site) for any section specific instructions regarding these and for other announcements in general. In particular, different sections will have different tests and your grades in these assesments may be scaled to ensure fairness across the different sections of the course. The final exam however will be the same for all sections.

INDIVIDUAL SECTION (TIMES & LOCATIONS)

- SECTION 101 (Instructor: Albert Chau) (MWF 9:00am-10:00am, LSK 201)

- SECTION 102 (Instructor: Albert Chau) (MWF 11:00am-12:00pm, LSK 201)
- SECTION 103 (Instructor: Ailana Fraser) (MWF 11:00am-12:00pm, MATX 1100)
- SECTION 104 (Instructor: Joel Feldman) (MWF 1:00pm-2:00pm, Buchanan A102)
- SECTION 105 (Instructor: Kalle Karu)(TT 9:30am-11:00am, Buchanan A102)
- SECTION 106 (Instructor: Kayvan Sadeghy)(MWF 3:00pm-4:00pm, LSK 200)
- SECTION 107 (Instructor: Boaz Elazar) (TT 3:30pm-5:00pm, Buchanan A102)
- SECTION 108 (Instructor: Jim Bryan)(MWF 2:00pm-3:00pm, West Mall Swing Space 221(MonWed),Hennings201(Fri)
- SECTION 109 (Instructor: Boaz Elazar)(TT 11:00am-12:30pm, MATH 100)

Go to individual section modules for instructor contact information.

TEXTBOOKS AND REFERENCES

There is no required textbook for the course. Most standard hardcopy books on multivariable Calculus, and also some free online books would serve our purposes in this course. You are free to use any these as you like. JUST PAY ATTENTION THAT EMPHASES AND ORDER OF TOPIC PRESENTATION IN OUR LECTURES MAY DIFFER FROM ANY GIVEN TEXTBOOK. The following online books (first two in particular) are in fact all you need for the course and references in the course will be limited to these.

- UBC Calculus Textbook series (See CLP 3 of this series. Reference to sections and also suggested exercises appear below)
- reference #1 (Reference to sections and also suggested exercises appear below).
- reference #2
- reference #3

Our reference and use of these free online textbooks will be in accordance with the creative commons liscence.

WEBWORK ONLINE HOMEWORK

- Access your weekly webwork assignments through the ``Assignments" table on left. All information on these assignments including due dates is indicated within the

webwork site. Note that the intent of homework is to help you learn the material, and therefore it should be done as you are studying.

IN CLASS TESTS (see your own section site for more details)

There will be 4 Tests which you can think of as short midterms. These will be approximately 20-30 minutes in duration each, to take place in class on the dates listed below. The information for each Test below will be updated closer to the time of the Test. The solutions to these will be posted on your individual section links. The Friday dates below are for MWF sections, and the Thursdays are for TT sections.

- **Test 1 (3-D geometry)**: (Fri Sept 20 and Thursday Sept 19)
- **Test 2 (Differentiation Part 1)** : (Fri Oct 11 and Thursday Oct 10)
- **Test 3 (Differentiation Part 2)** : (Fri Oct 25 and Thursday Oct 24)
- **Test 4 (Integration)**: (Fri Nov 15 and Thursday Nov 14)

COURSE OUTLINE

The following is an outline of the topics to be covered in the course. The suggested problems from the references listed below roughly represent the order in which we will be covering the topics. These will not be collected or graded. The topic outline, and suggested problems, can be viewed also as LEARNING GOALS for the course. You are strongly advised to work out the problems in detail before looking at the solutions as they will give you practice in the techniques learned in class and provide essential help in preparing for the WebWorK homework, midterms, and final exam. Suggested problems from PAST FINALS are also listed below. Note that you can also search the Math 200 resource wiki for past exam problems based on their topics. Finally, you are encouraged to learn how to use Wolfram Alpha (the syntax you need to know for this is similar to using Webwork, which you will have to use anyways) although there will not be specific reference to it in the course. You can even check some of your homework answers with Wolfram Alpha.

PART I: 3-DIMENSIONAL GEOMETRY (Chapter 1 (CLPIII)); (10.1-10.6 (reference #1))

Coordinate systems, equations and surfaces, vectors. Think of this section as pre-multivariable Calculus.

TOPICS:

-three dimensional coordinate systems

-equations and surfaces in space

-vectors; arithmetic, dot product, cross product

-lines and planes

suggested problems from CLP3:

See CLP-3 Multivariable Calculus problem book (Chapter 1). There you will also find solutions to some past final exam problems.

suggested problems from reference #1:

Section 10.1, problems 1-3, 7, 9, 12, 16, 15, 17, 27, 32

Section 10.2, problems 1-5, 8, 11, 15, 20, 23, 27, 31

Section 10.3, problems 1-3, 11, 15, 19, 31, 39

Section 10.4, problems 1-5, 9, 15, 27, 30, 31, 35, 39, 41

Section 10.5, problems 7, 11, 21, 27, 31

Section 10.6, problems 1, 2, 9, 11, 14, 15, 17, 19, 25, 29, 32

suggested problems from past final exams (mostly involving lines and planes in space):

2015WT1 #1a, b

2013WT2 #1a, b, c

2013WT1 #1a (i, ii)

2012WT1 #1

2011WT2 #1

PART II: DIFFERENTIATION OF MULTIVARIABLE FUNCTIONS (Chapter 2 (CLPIII)); (12.1-12.8 (reference #1) & 14.8 (reference #2))

The differentiability of a two variable function $f(x, y)$ at a fixed point $(x, y) = (a, b)$ is symbolically expressed by the equation

$$df = Adx + Bdy$$

asserting that: for some fixed numbers A and B, any infinitessimal(tiny) changes dx, dy in the variables produce a corresponding change df in the function satisfying the symbolic equation. A very similar equation is used in the case of a function of 3 or more variables. We will learn the precise meaning of the above symbolic equation, how to use it, and how it encodes almost all the important formulas from multivariable Calculus.

TOPICS:

-Functions of several variables

-limits and continuity

-Partial derivatives

-Tangent planes and linear approximations

-chain rule

-directional derivatives and gradient vector

-Maximum and minimum values, Lagrange multipliers

suggested problems from CLP3:

See CLP-3 Multivariable Calculus problem book (Chapter 2). There you will also find solutions to some past final exam problems.

suggested problems from reference #1:

Section 12.1, problems 1-6, 7, 11, 17, 19, 21, 23, 26, 27, 29, 31

Section 12.2, problems 17, 18, 19 Section 12.3, problems 1-4, 5, 13, 19, 29, 33

Section 12.4, problems 7, 10, (find equation of tangent plane to z=f(x, y) at given point for 11, 12) , 13, 15, (find linear approximation for 17, 18 at the given point)Section 12.5, problems 1-5, 9, 17, 21, 29

Section 12.6, problems 1-6, 13, 15, 21, 23, 25, 27

Section 12.7, problems 17, 19, 21, 23

Section 12.8, problems 1-4, 5, 7, 11, 13, 15, 17 (also 11, 13, 15, 19 from 14.7 in reference #2)

Section 14.8 (from reference #2) 5, 10, 11, 12, 13, 15, 17

suggested problesm from past final exams (mostly involves linear approximation, tangent plane to graphs):

2016 #3 a)

2015 #2 ii

2011WT2 #2a

2011WT2 #2b

2011WT1 #1b, c

suggested problesm from past final exams (mostly involves chain rule and/or implicit diff.):

2016 #4 a)

2015 #3

2014 #2, #3

2013WT2 #2a

2013WT1 #1b(ii, iii)

2013WT1 #1c

2013WT1 #1d

2012WT1 #2, 3

2011WT2 #3

2011WT1 #2

suggested problesm from past final exams (involves gradient vectors and relations to directional derivatives, and level sets):

2016 2(i,iv); 3(b,c); 2015 #1(iii)

2015 #2(i, iii)

2014 #1, 4

2013WT1 #1b(i)

2013WT2 #2 b, c

2013WT1 #1e

2013WT1 #1f

2013WT1 #2

2011WT2 #4

2011WT1 #3

suggested problesm from past final exams (involves classifying local extrema, absolute extrema, Lagrange Multipliers):

2015 #4, 5

2014 #5

2013WT2 #3, 4

2013WT1 #3, 4

2012WT1 #4, 6

2011WT2 #5

2011WT1 #4

PART III: INTEGRATION OF MULTIVARIABLE FUNCTIONS (Chapter 3 (CLPIII)); (13.1-13.6 (reference #1) and 14.4 (reference #3))

The double integral of a two variable function $f(x, y)$ over a region R in the plane is denoted symbolically as

$$\int\int_R f(p)\, dA$$

and represents an area-weighted continuous summation of f over R where in particular: p represents a point in R, dA the area of an infinitessimal(tiny) patch around p, and $\int\int_R$ a continuous summation over all points p in R. We will give a more precise definition of double integrals, interpret them in various different contexts, and learn to calculate them explicitly. We will then similarly define and treat triple integrals of three variable functions over regions in space.

TOPICS:

-double integrals over rectangles

-double integrals over general regions

-Double integrals in polar coordinates

-applications of double integrals

-triple integral

-Triple integrals in cylindrical and spherical coordinates

suggested problems from CLP3:

See CLP-3 Multivariable Calculus problem book (Chapter 3). There you will also find solutions to some past final exam problems.

suggested problems from reference #1:

13.1 PROBLEMS: 7, 9, 19, 21 (also see #3, 5, 10, 13, 15 from section 15.1 reference #2)

13.2 PROBLEMS: 1-4, 7, 9, 13, 17, 21, 25 (also see #17, 21, 23 from section 15.1 reference #2)

13.3 PROBLEMS: 3, 4, 8, 13, 15

13.4 PROBLEMS: 1, 5, 6, 13, 24

13.6 PROBLEMS: 5, 7, 9, 11, 13, 15, 19, 23

14.4 (from reference #3) PROBLEMS: 11, 13, 15, 19, 22, 23

suggested problems from past final exams (double integrals):

2015 #6

2014 #6

2013WT2 #5, 6a

2013WT1 #5, #6

2012WT1 #7,8

2011WT2 #6, 7

2011WT1 #5, 6

suggested problems from past final exams (triple integrals in rectangular, cylindrical and spherical coord):

2015 #7, 8

2014 #8, 9

2013WT2 #7,8

2013WT1 #7, 8, 9

2012WT1 #9,10

2011WT2 #8, 9, 10

2011WT1 #7, 8

GETTING HELP AND ADDITIONAL RESOURCES (MATH AND NON-MATH RELATED)

- Math 200 resource wiki.
- In addition to your instructor's office hours, please take advantage of the Math Learning Centre drop-in tutoring. Do not wait till the exams -- if you feel uncomfortable with any of the material, talk to your classmates, talk to the instructor, and come ask questions at the Math Learning Centre.
- You can use Wolfram Alpha -- it is a wonderful tool for calculations, plotting graphs of functions of two variables, and various other tasks. If you want to visualize, for example, the surface x^2+xy-y^2+3z=0, just type in "plot (x^2+xy-y^2+3z=0)".
    - UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.
    Details of the policies and how to access support are available on the \ \url{https://senate.ubc.ca/policies-resources-support-student-success}{UBC Senate website}.

Course policies

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1. No electronic devices will be allowed at the final examination. This includes calculators, cell phones, music players, and all other such devices. Formula sheets and other memory aids will not be allowed.
2. Missing tests: If a student misses a test, that student shall provide a documented excuse or a mark of zero will be entered for that test. Examples of valid excuses are an illness which has been documented by a physician and Student Health Services, or an absence to play a varsity sport (your coach will provide you with a letter). **In the case of illness, the physicians note must contain the statement that ``this student was/is physically unfit to attend the examination on the scheduled date"**. There will be no make-up tests, and the weight of the missed midterm will be transferred to the final examination. **Please note that a student may NOT have 100% of their assessment based on the final examination. A student who has not completed a substantial portion of the term work normally shall not be admitted to the final examination.**
3. Missing the Final Exam: You will need to present your situation to the Dean's Office of your Faculty to be considered for a deferred exam. See the Calendar for detailed regulations. Your performance in a course up to the exam is taken into consideration in granting a deferred exam status (e.g. failing badly generally means you won't be granted a deferred exam). In Mathematics, generally students sit the next available exam for the course they are taking, which could be several months after the original exam was scheduled.
4. UBC takes cheating incidents very seriously. After due investigation, students found guilty of cheating on tests and examinations are usually given a final grade of 0 in the course and suspended from UBC for one year. More information.
5. Note that academic misconduct includes misrepresenting a medical excuse or other personal situation for the purposes of postponing an examination or quiz or otherwise obtaining an academic concession.

6. All materials of this course (course handouts, lecture slides, assessments, course readings, etc.) are the intellectual property of the Course Instructor or licensed to be used in this course by the copyright owner. Redistribution of these materials by any means without permission of the copyright holder(s) constitutes a breach of copyright and may lead to academic discipline.

Permission to record lectures in any way or form must be obtained from your own sections instructor.