

MAT200

Calculus

Department of International Management
Spring 2019

I. COURSE INFORMATION

Instructor: Erich Prisner

eprisner@fus.edu

Office Hours:

M 16:00-17:30, 17:15-17:45

T 10:15-11:15,

Th 12:00-13:00,

and by appointment, LAC 11

Class location: LAC 2

Class Meeting times: MTh 13:00-14:15

Final: Monday May 13, 11:00-13:00

II. COURSE DESCRIPTION

The course begins with a review of functions and their graphs, after which students are introduced to the concepts of differentiation and integration. Understanding is reinforced through extensive practical work, with a strong emphasis on applications.

Calculus deals with functions and change. Besides limits, the two main concepts are derivatives and integrals. All these concepts will be introduced thoroughly.

We will treat the standard techniques (product rule, chain rule, implicit differentiation) of differentiation. Differentiation can be applied to solve optimization problems, whereas integration is used to compute areas. The Fundamental Theorem of Calculus, which connects both concepts of differentiation and integration, will also be covered. We apply these techniques to polynomials, rational functions, power functions, exponential and logarithmic functions, and combinations thereof. Many applications will be given.

III. RATIONALE

Calculus satisfies the Math core requirement. It is also needed in the majors of International Economics and International Banking and Finance. Furthermore it counts, and is required for the Math minor.

IV. COURSE GOALS

Calculus is important for two reasons: First, it is a very important part of our culture. It was one of the main success stories allowing science to develop into what it is today. Second, Calculus is needed in other subjects, Economics, Physics, other Natural Sciences, and Engineering, for instance.

The goal of the course is to provide students with a good understanding of the concepts of Calculus, and also to give them the techniques at hand which they need in applications as in Management Science and Economics. Very important

for applications are the ability to formulate a “real world problem” in mathematical terms, to solve it, and to interpret the results.

V. SPECIFIC LEARNING OUTCOMES

Upon completion of this class, students should

- have a clear understanding, intuitive but also formal, of the main concepts in Calculus and their importance.
- be familiar with the historical development of Calculus, and its role for other subjects.
- be able to use the techniques of Calculus to solve mathematical problems.
- be able to use the techniques of Calculus to solve real-world problems, with or without the use of technology.
- be able to communicate both concepts and methods verbally and in written form.

VI. REQUIRED TEXTS AND MATERIALS

Calculus for Business, Economics, and the Social and Life Sciences by L.D. Hoffmann and G.L. Bradley, McGraw-Hill. There are also some Youtube videos available, and more material on MOODLE.

VII. ASSESSMENT OVERVIEW

At the end of the semester, you will receive a score from 0 to 100%, based on the following:

- Homework: 10%
- Four best of five quizzes: 12%
- Group Score in the 2 Group Projects: 15%
- Individual Score in the 2 Group Projects: 15%
- Midterm exam: 18%
- Final exam: 30%

Nonattendance may lower your score as will be described below.

VIII. ASSESSMENT DETAILS

Homework:

Homework will be assigned almost every week, and will be collected. I will only look at parts (approximately 30%). No late homework will be accepted. You are allowed (and encouraged) to work in groups and to discuss assignments, but everything submitted must be your own work: You must have done it either alone or in a group, and you must have understood it. You should be able to explain your solution to me or to the class. Homework is a very important part of the class: It will form the basis of much class discussion, and the questions in the tests and quizzes will usually be very close to homework exercises assigned. Usually the homework will be individualized—every student will get different questions to work on.

Two Group Projects:

Each student will twice participate in a complex group project for groups of 3-5 students. There will be a theme for each of these projects, starting relatively easy and concrete and moving open-ended into more difficult directions as we

go. The purpose is to write a typed paper of 5-10 pages for each of these projects. Submitting a sequence of formulas is not enough, instead you should describe the problem and its solution in detail, including explanations, descriptions, formulas, calculations, graphs if needed. I will be the group coordinator for each of these groups, and assign assignments to members of the group as I see fit. These assignments will eventually be used in the project. We may have presentations of the first projects in class if time allows. There will be deadlines for a first draft and also for the final version.

For each group there will be a group grade (worth 7.5% for each of the projects) but also individual grades (again worth 7.5% for each project), where I take into account the individual contribution of the group member to the project as I observed it.

Quizzes, Midterm, Final:

There will be about five 15-minutes quizzes. Only the best four of them count. There also will be a midterm exam and a final exam. No make-up quizzes or tests are given, unless there is documented evidence of a medical (or other serious) problem.

Attendance:

Regular attendance is required. Being late counts as half an absence. You can miss 4 classes without penalty, but I will subtract 5% from your score for each further missed class.

IX. GRADING POLICIES AND EXPECTATIONS

Final grades will be determined as follows:

	A: 93 - 100 %	A-: 90 - 92.9 %
B+: 87 - 89.9 %	B: 83 - 86.9 %	B-: 80 - 82.9 %
C+: 77 - 79.9 %	C: 73 - 76.9 %	C-: 70 - 72.9 %
D+: 67 - 69.9 %	D: 63 - 66.9 %	D-: 60 - 62.9 %
F: below 60 %		

X. HOW TO DO WELL IN THIS COURSE (POLICIES / REQUIREMENTS)

During classes: Attend class, participate, ask questions, or answer them, if you can. Work on the in-class assignments. In Mathematics, you don't have to believe the teacher, rather (ideally) everything has to be understood. Please interrupt as soon as something is unclear.

Between classes: Class time is precious, so I have to ask you often to read or view some material prior to coming to class. In that case, please write down questions and ask them during class. This model is called the "flipped classroom". Do the homework and submit it at the deadlines to me. Please review the material covered in class also after class. Contact me as soon as problems occur.

If you miss a class, you are expected to find out (by contacting me, for instance) which material was covered and which announcements were made during class. Please don't leave during class. Please focus on the material during class and don't do anything else. Computers are banned for most of the parts of the class, cellphones are banned for all parts.

Calculator Policy: You are encouraged to use any type of calculator on homework assignments and projects. Simple calculators are also allowed in quizzes, and tests, but more sophisticated calculators may be banned in certain quizzes and parts of tests.

XI. ACADEMIC INTEGRITY: STATEMENT ON CHEATING AND PLAGIARISM

A student whose actions are deemed by the University to be out of sympathy with the ideals, objectives or the spirit of good conduct as fostered by the University and Swiss community, may be placed on Disciplinary Probation or become subject to dismissal from the University. Cheating is a dishonest action out of sympathy with the ideals, objectives and spirit of the University. Furthermore, cheating reflects negatively on one's personal integrity and is unjust to those students who have studied.

See the Academic Catalog for full statement (page 199):

<https://www.fus.edu/files/FUS-academic-catalog-2018-2020.pdf>

In particular, all work submitted must be your own work, and in tests you are not allowed to use notes, cell phones, talk with other students, or copy their work. In case of a violation you will get 0 points for the assignment and be reported to the Dean of Academic Affairs.

XII. RESOURCES AVAILABLE

If you have questions, I am the first person to contact. You can come during office hours but also send me an email if these hours don't work for you. Then we can find another time. The Writing and Learning Center (WLC) also offers help in Mathematics and for the writing part of the project.

XIII. TENTATIVE COURSE SCHEDULE

Week 1: Introduction, Syllabus, Functions, 1.1-1.3 // 1.4,
Week 2: Limits 1.5, Continuity 1.6 // Slope, the Derivative, 2.1, Quiz #1,
Week 3: Elementary Techniques of Differentiation, 2.2, Product and Quotient Rules 2.3 // Chain Rule 2.4, ,
Week 4: Implicit Diff, 2.6, Related Rates 2.6 // Start with Project 1, Quiz #2,
Week 5: Work on Project 1 // 3.1, 3.2,
Week 6: Work on Project 1, Optimization, 3.4 // Work on Project 1, Applied Optimization 3.5, Quiz #3,
Week 7: Midterm // Work on Project 1,
Two weeks of Academic Travel
Week 8: Exp/Log. Functions 4.1, 4.2, Diff. Of Log/Exp Fcts., 4.3 // Antidifferentiation, 5.1 ,
Week 9: Integration by Substitution, 5.2 // The Definite Integral and the Fundamental Theorem 5.3, Quiz #4,
Week 10: Distributions, Lorenz Curve and Gini index, Density Functions 6.4 // Start with Project 2,
Week 11: Work on Project 2 // Work on Project 2, Some Topic, Quiz #5,
Week 12: -No Class on Monday // Work on Project 2, Some Topic,
Week 13: Some Topic // Review,

Final: Monday May 13, 11:00-13:00

The schedule of the quizzes may change.