University of Minnesota, Morris
Syllabus for Math 1021, Survey of Calculus
Spring 2016

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1 Introduction

Welcome to Survey of Calculus. To find out more about me, you should check out my homepage, `http://facultypages.morris.umn.edu/~roberts/`. For relatively brief questions, a good time to talk to me is right before or right after class. For longer questions, I am looking forward to seeing you in my daily office hours. You can find me in the Science Building, Room 2360. You can also reach me at `roberts@morris.umn.edu`, 589-6348 (work) or 589-4628 (home).

To be in this course you should either have placed into it or successfully completed Math 1012, PreCalculus I: Functions. If you do not meet this prerequisite, you are unlikely to do well in the course and you should see me as soon as possible.

The goal of the course is to give you an overview of calculus. The catalog description is

> Short course for students in social sciences, biological sciences, and other areas requiring a minimal amount of calculus. Topics include basic concepts of functions, derivatives and integrals, exponential and logarithmic functions, maxima and minima, partial derivatives; applications.

Our text is

> Calculus for business, economics, and the social and life sciences
> (brief edition, eleventh edition)
> by Laurence Hoffmann, Gerard Bradley, Dave Sobecki, and Michael Price.

You might be interested to know how our course compares to Math 1101, Calculus I. In many ways, the two courses are similar. A general difference is that our course is somewhat gentler. A specific difference is that two large topics in Calculus I are completely omitted in Survey of Calculus: trigonometry, and *Mathematica*. Correspondingly, this course is four credits while Math 1101 is five credits.

University policy says "one credit is defined as equivalent to an average of three hours of learning effort per week..." Our course is a four-credit course, meeting (rounding up!) approximately four hours per week. Thus, *you are expected to spend eight hours per week working outside of class.* My job is to make your learning effort as efficient and pleasant as possible, but it is your job to put in the quality time!

This course aligns with several components of the UMM Student Learning Outcomes (`http://www.morris.umn.edu/committees/Curriculum/Learning_Outcomes_Approved.pdf`), including problem-solving, written communication, quantitative literacy, and collaboration.

2 Course components

Book. The book presents the material we will be learning in an organized and comprehensive way. A good idea would be to try to understand the main point of a given section *before* coming to the corresponding class. I'd recommend spending about an hour a week reading ahead for the next class. I'd recommend spending about two hours a week doing extra problems, as discussed below. Regular use of the book out of class is very important to doing well in the class.

Class periods. We meet three afternoons a week in Science 3650:

Mondays	2:15-3:20,
Wednesdays	2:15-3:20,
Fridays	2:15-3:20.

Class periods will be a mixture of activities. I will explain some of the theoretical points of the text. I will work out solutions to problems in the text. You will have time to work out similar problems, giving and getting help from your neighbors. I will be asking the class questions and you should always feel free to ask me questions throughout the class period. The aim is to have you feel that each class period is well-spent.

***WeBWorK* Homework.** Assigned homework exercises are a crucial component of our course. We will be using the program *WeBWorK.* You can log in from any computer with an internet connection. The problems I have chosen range from straightforward to challenging, and are presented in no particular order. For straightforward problems you may be able to simply type in the right answer. For the more challenging ones, you can expect to do a lot of paper and pencil work before obtaining the right answer. Typically, the *WeBWorK* assignment covers only part of the lecture, so you should never conclude that something is not important just because it is not reinforced in *WeBWorK.*

You log into *WeBWorK* at

`http://webwork.morris.umn.edu/webwork2/S16SurveyCalc_Roberts/`

(save this address; there is also a link on my homepage). Your user name is your X500 name, as in chang137, and your password is your student ID, as in 3407631. You should change your password later, to keep your *WeBWorK* scores private.

All students are assigned very similar problem sets. However numbers and other aspects of the problems vary slightly from student to student. *You are highly encouraged to help each other out on the problem sets.* Because of this randomization feature of *WeBWorK*, it's possible to have lots of communication between students, and still have each student go through the details himself or herself. It would be a good idea for you to print out your individualized homework set, especially so you can study from it later.

WeBWorK also grades your work, and in total *WeBWorK* homework counts for 20% of your grade, as will be explained at the end of this syllabus. The whole point of *WeBWorK* is to help you learn the material *efficiently* and *without stress.* If you give the wrong answer to a problem, you may get no credit or partial credit, depending on the problem. You should then try to figure out what you did wrong, and do the problem again. You're given an unlimited number of tries to get full credit on each problem. Your credit level on a problem can never go down. The one thing to be concerned about is the due time, which is generally 15 minutes before the next class begins; after the due time, you can't get more credit on a problem set (although you can still practice with it). I would certainly recommend doing the problem sets the night before they are due, rather than the day they are due.

WeBWorK is simply a tool to help you learn calculus. Like all tools, it has to be used properly to work. You need to be *thinking* and *actively trying to learn* all the time as you're doing the problem set (certainly not just "doing the minimum to get the credit"). If something's confusing to you, that's a perfect question for the next day's class. If you can only do the problems with lots of assistance from your classmates, that should be an immediate red flag that something's wrong. You should then see me to talk about the situation.

I estimate that working through and reflecting on the homework assignments should take about two hours a week.

Writing assignments. There will be five writing assignments, with due dates indicated on the day-to-day calendar. The first will be completely different from all the rest. Here it is: *Describe in 1-2 double-spaced typed pages a connection or connections between mathematics and your life.* You can write in general about the math instruction you have had in the past from your earliest days to college. You can write about specific experiences you have had. You can write about your general attitude towards mathematics, perhaps identifying parts you like and others you don't like so much. You can write about the role that you expect mathematics to play in your years in college and your career. It's your choice what to write about. The purpose of this assignment is to help me to get to know you better in a way which is relevant for our course.

The remaining four writing assignments will each involve solving a mathematical problem. You will do each writing assignment with a different partner of your choice. The purpose of these writing assignments is to help you write mathematics well. What is a well-written solution? *It is certainly not just scratchwork with the numeric solution boxed.* Rather a good solution is an *organized document* which *explains* the solution. It is required that all computational work be embedded in a narrative consisting of complete English sentences. Often, a graph or a table is part of the explanation too, and the relevance of the graph or table is explained by the text. Our text provides many examples of good solutions and I will provide others in the lecture.

Calculators. You should all buy or borrow a graphing calculator. There will be many times in the course when a graphing calculator will be useful. However, we will be emphasizing doing problems by hand, and commonly the calculator will be used only to do the problem in an alternative way to check the answer obtained by hand.

You are responsible for understanding how your calculator works, and I will generally not be entering into discussions about which buttons to push. When I present calculator work in front of the class, I will be using the software program *Mathematica*. As already mentioned, this program is used extensively in Calculus I. It is also used in higher level math courses that you might take. You will occasionally see me type *Mathematica* commands. However you are not responsible at all for *Mathematica* commands in this course.

Tests. There will be five in-class tests and then a final. The final exam will cover all the material in the course. It will be two hours in length but otherwise be like the in-class tests. *All the tests will emphasize the material covered in lecture and the assigned homework problems. Some of the problems will be directly modeled after problems in the text.* Your writing assignments are also very relevant for the tests because, for full-credit, *it is required that solutions on tests be well-written.*

Calculators will be allowed and useful on Tests 1, 2, and 4. They will not be allowed on Test 3, Test 5, and the final. Thus it is essential that you be able operate in two modes, with calculators and without them.

Out of class resources. I highly recommend that you work with your classmates outside of class. Students who work together are generally more successful and find the whole experience more enjoyable.

You are always welcome in my office hours. They are

Mondays	9:15-10:15,
Tuesdays	8:00-9:00 and 10:30-11:30,
Wednesdays	1:15-2:10,
Thursdays	2:00-2:55.

Since my office hours are scattered throughout the day, there should be at least one or two days per week that you can attend! Also we can meet by appointment. *Each of you should drop by at least once in the first three weeks, so that we can get to know each other better.*

Finally, you can make an appointment or drop in to Room 260 in the library for tutoring. See `https://netfiles.umn.edu/umm/www/academicsuccess/tutor_schedule.pdf` . The exact schedule is not yet determined. The tutors in the library are not at all reserved for students who are struggling. Any student can use the these tutoring services. They are free, and all are welcome.

Disability Resource Center. It is University policy to provide reasonable accommodations to students with disabilities, including psychiatric, attentional, learning, vision, hearing, physical, and systemic disabilities. If you think you may have such a disability, you are invited to contact the Disability Resource Center in Room 240 of Briggs Library. Additional information is available at `www.morris.umn.edu/services/dsoaac/dso.`

3 Schedule

On this page and the next, you'll see a day-by-day schedule for our course. We will adhere to it as closely as possible, but there may be small deviations. *WeBWorK* problem sets will generally be put up a few days before the corresponding class. Occasionally, you may need to get ahead on homework because of other time commitments. The due dates of the writing assignments are also indicated.

Date	Topic
Mon, Jan 18	*Martin Luther King Day*
Wed, Jan 20	1.1 Functions
Fri, Jan 22	1.2 The Graph of a Function
Mon, Jan 25	**W1 Due.** 1.3 Linear Functions
Wed, Jan 27	1.4 Functional Models
Fri, Jan 29	1.5 Limits
Mon, Feb 1	1.5 and 1.6
Wed, Feb 3	1.6 One-Sided Limits and Continuity
Fri, Feb 5	Review of Chapter 1
Mon, Feb 8	**Test 1** *(calculators allowed)*
Wed, Feb 10	2.1 The Derivative
Fri, Feb 12	2.2 Techniques of Integration
Mon, Feb 15	2.3 Product and Quotient Rules; Higher order Derivs
Wed, Feb 17	2.4 The Chain Rule
Fri, Feb 19	**W2 Due.** 2.5. Marginal Analysis and Approximations
Mon, Feb 22	2.6. Implicit Differentiation and Related Rates
Wed, Feb 24	Review of Chapter 2
Fri, Feb 26	**Test 2** *(calculators allowed)*
Mon, Feb 29	3.1 Increasing and Decreasing Functions; Relative Extrema
Wed, Mar 2	3.2 Concavity and Points of Inflection
Fri, Feb 4	3.3 Curve Sketching
Mon, Mar 7	3.4 Optimization
Wed, Mar 9	**W3 Due.** 3.5. Additional Applied Optimization
Fri, Mar 11	Further Work in Chapter 3

Date	Topic
Mon, Mar 21	Review of Chapter 3
Wed, Mar 23	**Test 3** *(calculators not allowed)*
Fri, Mar 25	4.1 Exponential Functions
Mon, Mar 28	4.2 Logarithmic Functions
Wed, Mar 30	Further work with 4.1 and 4.2
Fri, Apr 1	**W4 Due.** 4.3 Differentiation of Logarithms and Exponentials
Mon, Apr 4	4.3 continued
Wed, Apr 6	4.4 Additional Exponential Models
Fri, Apr 8	Review of Chapter 4
Mon, Apr 11	**Test 4** *(calculators allowed)*
Wed, Apr 13	5.1 Antidifferentiation: The Indefinite Integral
Fri, Apr 15	5.2. Integration by Substitution
Mon, Apr 18	Further work with 5.1 and 5.2
Wed, Apr 20	5.3 The Definite Integral and the FTC
Fri, Apr 22	**W5 Due.** 5.4 Applying Definite Integration
Mon, Apr 25	5.5 and 5.6 (parts) Applications
Wed, Apr 27	Review of Chapter 5
Fri, Apr 29	**Test 5** *(calculators not allowed)*
Mon, May 2	Another look at all topics to deepen understanding
Wed, May 4	"
Fri, May 6	"
Tues, May 10	**Final Exam.** 4:00-6:00 *(cumulative; calculator not allowed)*

4 Grading policy

Grades will be determined as follows.

Five 100-point chapter tests, lowest score dropped:	400 points
WeBWorK homework:	200 points
Five 30-point writing assignments:	150 points
Final exam:	200 points
Coming to office hours in the first three weeks	10 points
Class citizenship:	40 points
	1000 points

Class citizenship means coming to class regularly and on time, not using cell phones or other devices inappropriately, staying on task, helping other students, asking good questions, etc. This category should only be a factor for students right on grade borderlines.

Numerical grades will be converted to letter grades using the follow cutoffs.

		B+	87	C+	77	D+	65
A	95	B	83	C	73	D	60.
A−	90	B−	80	C−	70		

If you are taking the course S-N, you need a 70 to earn an S. A numerical score less than 60% corresponds to an F. *Please note that you are not competing against your fellow students.* I will adjust the difficulty of the questions and the scale of the grading so that say a B− score corresponds to what I consider B− achievement. Please note that your performance will likely fluctuate substantially. However my experience says that with so many components to your final grade, the final grade always accurately reflects your achievement.

University regulations encourage me to print the University-wide uniform grading policy. Here it is.

A Represents achievement that is outstanding relative to the level necessary to meet course requirements.

B Represents achievement that is significantly above the level necessary to meet course requirements.

C Represents achievement that meets the course requirements in every respect.

D Represents achievement that is worthy of credit even though it fails to fully meet the course requirements.

F Represents failure and indicates that the coursework was completed but at a level unworthy of credit, or was not completed and there was no agreement between the instructor and student that the student would be temporarily given an incomplete.

Other university policies which apply to this course are at Part B of
`http://policy.umn.edu/education/syllabusrequirements`

If you need to miss a test, you need to give me an acceptable excuse and then follow up our conversation with an *e-mail*. I will give you a make-up test or we will make some other arrangement.