

Math 1102 Calculus II Section 002 (5 cr)

Meeting Time: MWF 1:00–2:05pm and Tu 12:00–1:40pm in Sci 3510

Instructor: Barry McQuarrie

Office: Science 1380 (by exit to parking lot behind science building)

Office Hours: Mon 3:30-4:30pm, Tue 9:00-11:00am, Wed 3:30-4:30pm, Fri 9:15-11:00am

Email: mcquarrb@morris.umn.edu (preferred communication) Phone: (320) 589-6302 (I do not use voicemail)

Course moodle site: <https://ay15.moodle.umn.edu/course/view.php?id=482>

Course Prerequisites: Math 1101

To succeed in this course you will need to have mastered the basic concepts of differentiation and integration studied in Calculus I. Specifically, you should have the basic differentiation and integration formulas memorized, and be accomplished at using substitution to do integrals. You should also be comfortable working both graphically and algebraically when solving problems.

Learning Objectives

The primary goals of a student taking this course are to

- be able to create integral representations for volumes by revolution,
- understand and apply various advanced integration techniques, including:
 - integration by parts, integrals of trigonometric functions, trigonometric substitution, partial fractions,
 - approximate integration
- identify and evaluate improper integrals,
- understand some of the basic theory behind differential equations, and solve certain classes of differential equations,
- understand sequences and how sequences are related to series,
- work with series, and know how to test if a given series is convergent or divergent,
- continue to gain fluency in a powerful computer algebra system, *Mathematica* (this entails learning some of the syntax of *Mathematica*).

Beyond the curriculum, you should also expect to

- develop skill at presenting solutions to problems,
- think beyond technique, and understand the problems studied in some depth,
- develop confidence in your problem solving skills,
- see the benefit of computers to aid calculation, but also see the *absolute necessity* of understanding the theory completely before using a computer.

Time Commitment

University policy says “one credit is defined as equivalent to an average of three hours of learning effort per week (over a full semester) necessary for an average student to achieve an average grade in the course”. Our course is a five-credit course, meeting approximately five hours per week: 5 credits times 3 hours/week/credit - 5 hours/week

in lecture = 10 hours/week outside class. Thus, you are expected to spend 10 hours per week working outside of class, reading the textbook and working problems.

Please make the most of my office hours! **The content of the course can be difficult at times and I expect to see you all in my office at some time or other.** To get the most out of the course you should

- do homework every day (more on this later),
- allot time to think about what it is we are doing,
- discuss the techniques we are studying and their implementation with your classmates,
- discuss any difficulties with me during office hours.

Textbook

The required textbook is James Stewart Single Variable Calculus, early transcendentals 7th, 6th or 5th Ed—the bookstore will have the 6th Edition, and the course calendar is based on the 6th Edition. The differences between the editions is minimal, but if you use an earlier edition be aware that some of the sections may be numbered differently, content may be slightly different, and problems listed as practice below may not line up with your older edition. We will be covering Chapters 6–11 from this book.

We will be using the computer algebra system (CAS) *Mathematica*. This program is not described in our text. Rather you will be learning it as you go in class, using resources I will provide.

Course Components

I am demanding that solutions be written up well. This means solutions should be a self-contained document. They should be written legibly, contain diagrams or tables where appropriate, and should state the problem and explain the solution. Interspersing English sentences which explain what you are doing can help in this regard. With its worked-out examples, the book provides many examples of a good solution. There are also examples in the homework in the course moodle site. To say it in a more concrete way, *solutions with totally correct computations lacking in necessary good explanations will tend to receive a B, not an A.* We will be discussing the importance of communicating your results in more detail at various times in the course.

The course is hosted on a moodle site, and organized by week. For each topic you have a few days to learn the material and ask questions.

Textbook. The book presents the material we will be learning in an organized and comprehensive way. You should try to understand the main point of a given section before coming to the corresponding class.

Class periods. We meet four times a week in Sci 3510. Class periods will be a mixture of activities. I will lecture on some of the high points of the section. I will work out solutions to problems like your homework problems. Generally we will do a fair amount of work using *Mathematica*. I will be asking the class questions and you should always feel free to ask questions throughout the class period. It is important that you attend lectures because announcements regarding the class (upcoming tests, possible take-home assignments or homework, etc.) will be made in class, and assignments are due in class. **If you miss a lecture it is your responsibility to find out what you have missed—start by looking at the course moodle site. Assignments will be available in the Assignments Folder.**

Practice. Practice questions will not be collected. Mastery of the topics we study will only come with practice, making homework beyond the graded WeBWork a crucial component of our course. Every day when we cover a

new section there are example problems with complete solutions available on the course moodle site. You should faithfully write out solutions to many of these ungraded homework problems, before the next class begins! If you're wondering where to put in those ten weekly out-of-class hours, this is the main place along with WeBWorK! Although only a few practice questions are suggested for each lecture, you should do as many problems as needed to understand the day's lecture.

WeBWorK. You will be completing some assignments using the online homework utility WeBWorK, which you can learn more about on the course moodle site. The WeBWorK problems are provided to give you practice implementing the computational techniques we will be studying, although occasionally a problem will be more theoretical in nature. WeBWorK is assigned by section, and typically contains 5-7 problems and due the evening we cover the material in class. If you do not start the WeBWorK early, you will have difficulty completing it! Due dates are available in WeBWorK.

Not all types of problems you will see on tests are represented in WeBWorK, so it is important to also be reading the text and doing example problems that are not graded.

Graded Handwritten Homework. Every Friday you will turn in handwritten solutions to a few homework problems that were assigned the previous week. It is important in mathematics to be able to clearly explain your thought process in solutions, and the homework will allow you to receive feedback on your entire solution (not just the final answer, which is all WeBWorK cares about for the most part). If there is significant *Mathematica* used in your homework, which will happen occasionally, you will be able to upload your *Mathematica* file for the homework in moodle. Your *Mathematica* file submitted as part of homework should also be well explained, and contain sufficient text and headings (properly typeset) to help the reader understand your solution.

Tests. There will be five in-class tests and then a cumulative final. Most tests (including the final) will be no-aid tests (you will not be allowed to use calculators or *Mathematica*), except for Test 3 for which you can bring one sheet of paper (both sides) with whatever you want written on it. All the tests will emphasize the assigned homework problems. Also there may be questions similar to the concept-check questions and true-false quizzes.

Applied Projects. There will be a few applied projects you will work on during the semester. These are meant to give you a chance to see calculus in action, outside of the bounds of specific computational questions. The applied projects will be handed out in class, and are due on the dates shown on the course moodle site. You may work in groups of up to four people on the applied projects, and each group turns in one solution. Each group member will receive the same grade. Your groups can change for each applied project you do. The solutions for the applied projects must be well explained, written legibly and use correct mathematics.

Mathematica. We will be learning *Mathematica* as the semester progresses. *Mathematica* is a powerful computer algebra system that can do far more than a calculator. The skills you acquire when you learn *Mathematica* will translate to other technologies, and other areas of your life. If you are a math major, *Mathematica* is used throughout UMM's math major in virtually all of our courses to some extent, so this introduction will prepare you to do very interesting things with it later on in your academic career. If you are not a math major, studying *Mathematica* is an important aspect of understanding mathematics in a liberal arts setting—computation and using tools like *Mathematica*, maple, fortran, C, C++, Java, MuPad, SAS, Origin, etc, are increasingly an important part of mathematics. *Mathematica* will never do our thinking for us. It will help us understand concepts and answer questions that would be difficult to answer if we were working the solution out solely by hand. Our goal in Calculus II is to become fluent in basic *Mathematica* syntax and typesetting to produce good solutions to problems.

Grading

The University utilizes plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following:

A	4.000	Represents achievement that is outstanding relative to the level necessary to meet course requirements
A-	3.667	
B+	3.333	Represents achievement that is significantly above the level necessary to meet course requirements
B	3.000	
B-	2.667	
C+	2.333	Represents achievement that meets the course requirements in every respect
C	2.000	
C-	1.667	
D+	1.333	Represents achievement that is worthy of credit even though it fails to meet fully the course requirements
D	1.000	
S		Represents achievement that is satisfactory, which is equivalent to a C- or better

The grade for the course will be calculated by the following formula (there is no extra credit):

Applied Projects (Sep 30, Oct 21, Nov 11, Dec 11)	10%
Homework (13 sets due weekly every Fri at the start of class).....	15%
Tests (Sep 22, Oct 13, Nov 3, Nov 17, Dec 8).....	40%
WeBWorK (see WeBWorK for exact due dates; every Mon, Tue, Wed, Fri at 9pm)	15%
Final Exam (Wed Dec 16 11:00-1:00pm Sci 3510).....	20%

Your numerical grades will be converted to letter grades and finally Grade Points via the following cutoffs (grades are not rounded up):

Numerical	95.0%	90.0%	87.0%	83.0%	80.0%	77.0%	73.0%	70.0%	65.0%	60.0%	Below 60.0%
Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Grade Point	4.000	3.667	3.333	3.000	2.667	2.333	2.000	1.667	1.333	1.000	0.000

A Healthy Learning Environment

- **Attendance.** Attendance does not count towards your final grade, but missing class means you don't get the benefit of what we do in class, so please come to class and make sure to be in class on time. Neither I nor your fellow classmates enjoy the disruption late arrival causes. I know that situations crop up that will entail late arrival (please come even if you are late!) but try to ensure it is the exception and not the rule. Buy an alarm clock with a battery backup, as the power often goes out for a moment in Morris. If you are coming from another class and fear you may be late often, just let me know and don't stress about it. If you need to leave class early, let me know before class and slip out as unobtrusively as possible.
- **Computers/Cell Phones.** During class, cell phones and music devices should be turned off, and headphones removed from ears. If I find you are surfing the internet during class I will ask you to leave.
<http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>
- **Personal Conduct In Class and Online.** Be mindful of your peers around you, and keep stray chatter in class to a minimum. In the discussion forums and email communications, please consider the tone of your writing. We must maintain a respectful, open environment if we hope to have effective forum discussions. Also, make sure to use correct grammar, spelling, and punctuation in all your electronic communications. The UMM Student Conduct Code is available at http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf
- **Academic Dishonesty.** Cooperation is vital to your future success, which ever path you take. I encourage cooperation amongst students where ever possible, but the act of copying or other forms of cheating will not be tolerated. Academic dishonesty in any portion of the academic work for a course is grounds for awarding a grade of F or N for the entire course. Any act of plagiarism (presenting the ideas, words, or work of someone else as your own) that is detected will result in a mark of zero on the entire assignment or test. I will make it clear during class what is appropriate collaboration for each activity, but if you still have questions about what constitutes academic dishonesty, please come and talk to me. UMM's Academic Integrity policy and procedures can be found at www.morris.umn.edu/committees/scholastic/academicintegrity/.
Academic Dishonesty FAQ: <http://www.oscai.umn.edu/integrity/student/index.html>

- **Appropriate Student Use of Class Notes and Course Materials.** Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes or other course materials beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. **Students may not distribute instructor-provided notes or other course materials, except to other members of the same class or with the express (written) consent of the instructor.** For additional information, please see:

<http://www.policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

- **Late Work/Missed Exams.** Since the assignments are handed out days in advance, only under exceptional circumstances (which can be officially documented) will I accept late work. You will receive a mark of zero if an assignment is submitted late. **However, please talk with me asap (do not wait until the next class) if you missed turning something in, even if it is after the deadline.** If an assignment is partially complete but you are not granted an extension, still submit the work you have completed so you can earn some partial credit. This is far preferable to earning zero on the assignment by not submitting anything.

If you are going to miss a test (for a documented reason), let me know in advance so we can work out alternate plans. If you unexpectedly miss an exam/quiz/etc for a documentable reason, get in touch with me asap so we can work out alternate arrangements, or schedule a make-up.

Assignments are due in class (come to class and turn them in). Slipping assignments into my mailbox or under my office door while I am teaching your course is **severely frowned upon** unless we have agreed that you will be doing this.

- **Your Health.** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. If you have any special needs or requirements to help you succeed in the class, come and talk to me as soon as possible, or visit the appropriate University service yourself. You can learn more about the range of services available on campus by visiting the website:

<http://www.morris.umn.edu/academicalert/studentresources/>

- **Disability Resource Center.** The University of Minnesota Morris is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, autism spectrum disorders, chronic health, traumatic brain injury and concussions, sensory, or physical), please contact DRC at 240 Briggs Library or call 320-589-6178 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

- **Academic Alert.** I am strongly invested in making my best effort to ensure all my students (advisees, students in my classes, students I know through other avenues) have both a positive and productive experience at UMM.

To this end, I use academic alert periodically throughout the semester to inform students when their academic performance in my class could be improved. These alerts are not a punishment, and not an indication of a student's ability to be successful in the class—they are meant to give the student and the student's advisor a heads up that there are some areas to work on which can help improve the student's mastery of the material.

If you receive an academic alert from me, stop by my office (if you haven't already) to talk with me about your academic progress in the class to date, and we can discuss if there are opportunities or changes to your study practices that could help improve your understanding of the course material—and ultimately, of course, your grade!

Other Policies

- **Makeup Work for Legitimate Absences.**
<http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>.
- **Student Conduct.**
http://regents.umn.edu/sites/regents.umn.edu/files/policies/Student_Conduct_Code.pdf
- **Sexual Harassment.**
<http://regents.umn.edu/sites/regents.umn.edu/files/policies/SexHarassment.pdf>.

- **Equity, Diversity, Equal Opportunity, and Affirmative Action.**
http://regents.umn.edu/sites/regents.umn.edu/files/policies/Equity_Diversity_EO_AA.pdf.
- **Academic Freedom and Responsibility.**
http://regents.umn.edu/sites/regents.umn.edu/files/policies/Academic_Freedom.pdf.

Topics

- Short Review of Calculus I
- 6.1 Areas Between Curves
- 6.2 Volumes
- 6.3 Volume By Cylindrical Shells
- 6.4 Work
- 6.5 Average Value of a Function
- 7.1 Integration By Parts
- 7.2 Trigonometric Integrals
- 7.3 Trigonometric Substitution
- 7.4 Partial Fractions
- 7.5 Strategy for Integration
- 7.6 Integration Using Tables and CAS
- 7.7 Approximate Integration
- 7.8 Improper Integrals
- 8.3 Application to Physics and Engineering
- 8.4 Applications to Economics and Biology
- 8.5 Probability
- 9.1 Modeling with Differential Equations
- 9.2 Direction Fields and Euler's Method
- 9.3 Separable Equations
- 9.4 Models for Population Growth
- 9.5 Linear Equations
- 9.6 Predator Prey Systems
- 10.1 Curves Defined by Parametric Equations
- 10.2 Calculus with Parametric Equations
- 10.3 Polar Coordinates
- 10.4 Areas and Lengths in Polar Coordinates
- 11.1 Sequences
- 11.2 Series
- 11.3 The Integral Test and Estimate of Sums
- 11.4 The Comparison Tests
- 11.5 Alternating Series
- 11.6 Absolute Convergence: The Ratio and Root Tests
- 11.7 Strategy for Testing Series for Convergence
- 11.8 Power Series
- 11.9 Representations of Functions as Power Series
- 11.10 Taylor and Maclaurin Series
- 11.11 Applications of Taylor Series

Course UMM Campus Student Learning Outcomes (CSLO)

Knowledge of Human Cultures and the Physical and Natural World through:

- SLO-1a.(M) Core studies in the liberal arts: mathematics
- SLO-1b.(R) In-depth study in a particular field: its schools of thought, advanced theories, language, and methods of inquiry

Intellectual and Practical Skills, practiced extensively across students college experiences, including:

- SLO-2a.(I) Inquiry and Analysis
- SLO-2b.(R) Critical thinking and problem-solving
- SLO-2d-1.(I) Written
- SLO-2e.(R) Quantitative literacy
- SLO-2f.(R) Information and technology literacy
- SLO-2g.(R) Collaboration

Capacity for integrative learning, including:

- SLO-4b.(R) Application of knowledge, skills, and responsibilities to new settings and progressively more complex problems
- SLO-4c.(R) Skills for sustained learning and personal development