Math 22 Calculus II

Section A Fall 2022

Course Description: **MATH 022. QR: Calculus II. 4 Credits**
Prerequisite: C- or better in MATH 021. Credit will not be given for both MATH 022 and MATH 023. Students coming from the MATH 019 – 020 sequence without having taken MATH 021 are advised to take MATH 023 instead of MATH 022.

Course Overview:
MATH 022 is a continuation of the study of the calculus of functions of one variable begun in MATH 021. Topics will include techniques of integration, including integration by parts, trigonometric substitution, and partial fractions; applications of integration, including arc length and surface area; parametric equations and polar coordinates; sequences and series, including analytic tests for convergence; Taylor series; complex numbers; and an introduction to vectors in two and three dimensions. Topics will be presented with a level of depth and rigor appropriate for students pursuing degrees in technical fields such as mathematics, statistics, engineering, or the physical sciences. The computer algebra system Mathematica will be used throughout the course.
A detailed Course Content is at the end of this syllabus.

Learning Outcomes: After successful completion of the course, students will be able to:
- Evaluate definite and indefinite integrals by techniques of integration including substitution, the use of trigonometric identities, integration by parts, trigonometric substitution, and partial fractions
- Approximate definite integrals numerically
- Determine whether an improper integral converges or diverges, and find the value if it is convergent
- Apply analytic tests of convergence of series, and find the interval of convergence of power series
- Approximate sums of series numerically
- Find Taylor Polynomials, Taylor Series, and Maclaurin Series from first principles
- Work with parametric equations and polar coordinates
- Use integrals to compute arclength and surface area
- Work with vectors in two and three dimensions
- Compute dot products and cross products, and use them in applications
- Find equations of lines and planes in three dimensions
- Use Mathematica as a tool for working with functions, parametric equations, polar curves, sequences and series; making plots; carrying out numerical calculations; and performing algebraic and calculus operations symbolically

Textbook and Software:

1) REQUIRED TEXT with ONLINE HOMEWORK: Calculus, Early Transcendentals – Stewart/Clegg/Watson, 9th edition + WebAssign. Students will need to purchase an access code for the eBook version of the text and WebAssign online homework. The access code can be purchased with or without a physical copy of the textbook; note that only the access code is required. For details on the various options, see the Enhanced Course Description located in the Syllabus section of Blackboard. For Instructions on how to enroll in Webassign, see the "Webassign Instructions" in the Syllabus section of Blackboard.
Webassign Homework Class Key= uvm 1922 6752

2)REQUIRED SOFTWARE: MATHEMATICA

Instructions for installing Mathematica:
Go to the UVM Software Portal (software.uvm.edu)
Find Mathematica, and follow the instructions under *More Info* to obtain an Activation Key.
Then download the Mathematica installer and run it.
At the end of the installation process, you will be prompted for an Activation Key. Enter your key to activate the software.

Class time: The class meets 8:30 am to 9:20 am M W F in Aiken 110 as well as Tuesdays from 8:30 am to 9:45 am in Rowell 110.
Please refrain from using cell phones during class.

Attendance: Attendance is required. In accordance with University Policy, I allow students to miss classes due to religious observances, varsity sporting matches or any other activities stated in the UVM attendance policy. You must email me ahead of time telling me that you will be absent. If you will be absent, plan to ask a peer about what was covered in class. In borderline final letter grade situations, your attendance and participation may help your grade.

Notetaking: My Course Notes are available as a pdf on Blackboard in the Course Materials folder. The course is based almost entirely on these Notes. They cover 95% of what I present in class. You can use these notes instead of copying everything I write on the board so that you can listen and absorb the material better during class. The # 1 thing you can do to succeed in this class is to read the Course Notes outside of class.

Instructor Information:
Name: Dr. Dan Hathaway
Email : Daniel.Hathaway@uvm.edu **Include Math 22 A in the subject line*
Office: Innovation Bldg, Room 311
The best way to contact me is email.

Office Hours: Monday, Wednesday, and Friday 10:50 am to 11:50 am
Please feel free to email me to set up an appointment at another time if you have class during these office hours. Students are always welcome to ask me questions before or after class or send me an email for a fast response.

Blackboard:
Blackboard will be used for Announcements, Course Notes, and grades.

Homework:
Weekly homework will be posted on Webassign on Fridays and due the following Thursday on Webassign. Each homework will count the same amount and **the one lowest grade will be dropped**. Use the one dropped homework assignment wisely to cover any absences for university events, illness, family emergencies, funerals, and workload issues.

You have a maximum of 5 attempts for each problem.

WebAssign Extension Policy: You may request an automatic extension through WebAssign. The request for an automatic extension must be made within 2 days of the assignment due date. An automatic extension extends the assignment due date by 2 days from the extension request date.

Automatic extensions carry a penalty of 30% on the work that is late. *Extensions are not permitted if you have already viewed the Answer Key.* No manual extensions will be granted.

Labs: There will be up to eight assignments using Mathematica spaced throughout the semester, about every one to two weeks. These are called "labs" to distinguish from the weekly homework. The labs are to be completed and submitted electronically. There will be links in Blackboard to download and submit labs. Due dates will be posted in Blackboard. You may work with other students on the labs and help each other, but you each need to do the work for yourself and answer questions in your own words. Copying from another student or any other source is not permitted. **Your one lowest lab grade will be dropped.** Be sure to check that your lab submission to Blackboard is confirmed.

Quizzes: There will be a quiz every Tuesday except for the first week and every exam week. No makeup quizzes. **The lowest 3 quizzes will be dropped.** Use the three dropped quizzes wisely to cover any absences for university events, illness, family emergencies, funerals, and workload issues.

Midterm Exams: There will be 2 midterm exams. The dates of the midterms are Tuesday, September 27 and Tuesday, Nov 1. You may bring one 3 x 5 inch card filled front and back to the first midterm exam. You may bring two 3 x 5 inch cards to the second midterm. Each test is **cumulative** from the beginning of the course. No books, calculators or electronic devices. No make-up exams.

Final Exam: There will be a **cumulative** final exam given at the end of the semester. The final exam will be held Monday, Dec 12 at 7:30 AM (until 10:15 am) in Aiken 110. You may bring three 3 x 5 inch cards to the final exam. No books, calculators or electronic devices. No makeup exams.

On ALL exams and labs, you MUST show all your work, justify your answers and simplify as much as possible to get full credit. If you do not answer a True/False question on an exam, you will not get credit for it.

Computation of grade:
Homework: 15%
Labs:10%
Quizzes: 15%
Midterm1: 20%
Midterm2: 20%
Final Exam: 20%

Point Values for Final Grades:

A+	97–100%
A	93–96%
A-	90–92%
B+	87–89%
B	83–86%
B-	80–82%
C+	77–79%

C	73–76%
C-	70–72%
D+	67–69%
D	63–66%
D-	60–62%
F	< 60%

Math Help Center: Hours will be announced on Blackboard.

Tutoring Center:
The Tutoring Center is free to all undergraduate students. To schedule an appointment, go to their website: https://www.uvm.edu/academicsuccess/tutoring_center

IT Technical support for students:
Students should contact the Helpline (802-656-2604) for support with technical issues

Detail of Course Content:

We will cover the following chapters in the text:
Chapter 7 – Techniques of Integration
Chapter 8 – Further Applications of Integration
Chapter 11 – Sequences and Series
Chapter 10 – Parametric Equations and Polar Coordinates
Chapter 12 – Vectors and the Geometry of Space

The order of topics will be approximately as follows:
Integration by Parts (7.1)
Trigonometric Integrals (sinx and cosx) (7.2)
Trigonometric Integrals (other trigonometric functions) (7.2)
Integration by Trigonometric Substitution (7.3)
Integration of Rational Functions by Partial Fractions (7.4)
Numerical Integration (7.7)
Improper Integrals (7.8)
Arclength (8.1)
Surface Area (8.2)
Sequences (11.1)
Series (11.2)
The Integral Test and Estimates of Sums (11.3)
The Limit Comparison Test (11.4)
Alternating Series and Absolute Convergence (11.5, 11.6)
The Ratio Test (11.6)
Power Series (11.8)
Representations of Functions as Power Series (11.9)
Taylor Polynomials, Taylor Series and Maclaurin Series (11.10, 11.11)
Parametric Equations (10.1)
Slope and Area for Parametric Curves (10.2)
Polar Coordinates (10.3)
Area in Polar Coordinates (10.4)
Three-Dimensional Coordinates (12.1)

Vectors (12.2)
The Dot Product (12.3)
Vector Projections and Work (12.3)
The Cross Product (12.4)
Equations of Lines and Planes (12.5)
The Quadric Surfaces (12.6)
Complex Numbers, including polar form, Euler's formula, powers and roots (if time permits)

The following are General Policies from UVM:

Course Evaluation:

All students are expected to complete a mid-term evaluation and final evaluation of each course they are enrolled in. The evaluations will be anonymous and confidential, and the information gained, including constructive criticisms, will be used to improve the course.
Students can access Blue course evaluation via Blackboard Homepage, myUVM or by visiting *https://blue.uvm.edu/uvm. You can also link to the UVM Knowledge Base page with student instructions on how to access Blue course evaluations.*

Intellectual Property Statement/Prohibition on Sharing Academic Materials:

Students are prohibited from publicly sharing or selling academic materials that they did not author (for example: class syllabus, outlines or class presentations authored by the professor, practice questions, text from the textbook or other copyrighted class materials, etc.); and students are prohibited from sharing assessments (for example homework or a take-home examination). Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity.

Student Learning Accommodations:

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

Contact SAS:
A170 Living/Learning Center;
802-656-7753
access@uvm.edu
www.uvm.edu/access

Academic Integrity:

The policy addresses plagiarism, fabrication, collusion, and cheating.
https://www.uvm.edu/policies/student/acadintegrity.pdf

Code of Student Conduct:

UVM's Code of Student Conduct outlines conduct expectations as well as students' rights and responsibilities.

FERPA Rights Disclosure:

The purpose of UVM's FERPA Rights Disclosure is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

Final Exam Policy:

The University final exam policy outlines expectations during final exams and explains timing and process of examination period.

Grade Appeals:

If you would like to contest a grade, please follow the procedures outlined in this policy.

Grading:

This link offers information on grading and GPA calculation.

Religious Holidays:

Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time. The complete policy is here.

Promoting Health & Safety:

The University of Vermont's number one priority is to support a healthy and safe community:
Center for Health and Wellbeing
Counseling & Psychiatry Services (CAPS) Direct Phone Line: (802) 656-3340
C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the C.A.R.E. Team website.
Food Insecurity: The UVM Center for Health & Wellbeing provides several on- and off-campus resources for students struggling with food insecurity: https://www.uvm.edu/health/food-insecurity-uvm

Statement on Alcohol and Cannabis in the Academic Environment:

As a faculty member, I want you to get the most you can out of this course. You play a crucial role in your education and in your readiness to learn and fully engage with the course material. It is important to note that alcohol and cannabis have no place in an academic environment. They can seriously impair your ability to learn and retain information not only in the moment you may be using, but up to 48 hours or more afterwards. In addition, alcohol and cannabis can:

- Cause issues with attention, memory and concentration
- Negatively impact the quality of how information is processed and ultimately stored
- Affect sleep patterns, which interferes with long-term memory formation

It is my expectation that you will do everything you can to optimize your learning and to fully participate in this course.

Math 22	**Course Schedule Detail**	**Fall 2022**		Note: Subject to Change
Week	Monday	Tuesday	Wednesday	Friday
1	Ch1 Review of Calc I ; Start Ch2 Integration by Parts	Continue Ch2	Continue Ch2; Practice 1	Finish all of what we will do of Ch2 (last few examples left for students to read); 1st 2 pages of Ch3 Trig Integrals
2	No School	Continue Ch3	Finish Ch3; Started Ch4 Trig Substitution; Quiz 1	Continue Ch4
3	Finish Ch4; Start Ch5 Integrating Rational Functions	Continue Ch5	Finish Ch5; Quiz 2	Start and Finish Ch6 Approximate Integration; Start Ch7 Improper Integrals
4	Continue Ch7	Continue Ch7	Finish Ch7	Start Ch8 Arc Length
5	Review for Exam #1	Exam #1	Finish Ch8	Start Ch9 Area of a Surface of Revolution
6	Continue Ch9	Finish Ch9; Start and Finished Ch10 Sequences	Start and 3/4 through Ch11 Series	Introduction to Infinity (Not in Course Notes or Text)
7	Finish Ch11; Start and almost finish Ch12 Integral Test	Finish Ch12; Half of Ch13 Comparison Tests	Finish Ch13; Most of Ch14 Alternating Series and Absolute Convergence	No School
8	Finish Ch14; Start Ch15 Ratio and Root test	Finish Ch15; CH16 Strategy for Testing Series; Start Ch17 Power Series	Finish Ch17	Start Ch18 Representation of Functions as Power Series
9	Finish Ch18; Started Ch19 Taylor and Maclaurin	Finish Ch19	Ch20 Applications of Taylor Polynomials	Ch 21 Curves Defined by Parametric Equations; Start Ch22 Calculus with Parametric Curves
10	Review for Exam #2	Exam #2	Continue Ch22	Finished Ch22
11	Ch23 Polar Coordinates	Start Ch24 Calculus with Polar Coordinates	Finish Ch24	Ch 25 Three Dimensional Coordinate System; Start Ch 26 Vectors
12	Finish Ch26; Start Ch27 Dot Products	Finish Ch27	Start Ch28 Cross Products	Finish Ch28
	No School	No School	No School	No School
13	Ch29 Start Equations of Lines and Planes	Continue Ch29	Finish Ch29; Ch30 Cylinders and Quadric Surfaces	Complex Numbers
14	More Complex Numbers	Jeopardy!	Review for Final Exam	Review for Final Exam