Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: Math
Course and Section #: 1220-X02
Course Title: Calculus II
Credits: 4

Course Description

Includes applications of integration, integration techniques, arc length, area of a surface of revolution, moments and centers of mass, sequences and series, and parametrization of curves and polar coordinates.

Course Attributes

This course has the following attributes:
☒ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☐ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☐ Open Elective
Other: *Click here to enter text.*

Instructor Information

Instructor Name: Dr. Reinhard O.W. Franz

Student Learning Outcomes

Upon successful completion of this course a student should be able to:

- Use integrals to compute the area between two curves, volumes of solids of revolutions or known cross sections, and the average value of a function.
- Solve application problems related to integration including force, work, and volume.
- Compute definite, indefinite, and improper integrals using integration by parts, trigonometric substitution, and partial fraction decomposition.
- Approximate definite integrals using approximation formulas including Simpson's rule.
- Find the area of a surface of revolution, centroids, hydrostatic force, and the arc length of curves, parametric curves, and in polar coordinates.
- Determine convergence and divergence of sequences and series using Partial Sums, Geometric Series Test, p-series Test, the Integral Test, Comparison Test, Limit Com- parison Test, Alternating Series Test, Ratio Test, and Root Test.
- Find the interval of convergence of power series, Taylor series and Taylor polynomials of functions, and error bounds using the Taylor Inequality.

Course Materials and Texts

Calculus Volume 2, openstax, ISBN: 978-1-938 16-806-2, hardcopies of the text are available for as little as $20. Link to text.

Course Requirements

Course Assignments, Assessments, and Grading Policy

1. **Content Delivery**: For your convenience, I have recorded lectures for (almost) all sections of the text which we will study in this course. I have tried to present the material in great detail and illustrated the new concepts and techniques by many examples. *The video files are rather large. You might want to download them before you watch them.* In addition, I included the lecture notes of each lecture, so that you don't have to take notes yourselves, but can add comments to the lecture notes. I will post the lectures and the lecture notes for the upcoming week on Canvas under Assignments together with a list of exercises which will help you practice and understand the new concepts and techniques on a deeper level. Make sure that you study the lectures attentively and read the corresponding material in the textbook. this will give you two perspectives.
2. **How to Succeed in This Class**: Calculus provides an important basis for many disciplines, which you might not realize at this point of your education. It is crucial that you develop a solid understanding of the new ideas and techniques introduced in this class and competency in applying the computational skills taught. Don't just focus on obtaining a good grade! A good grade without the accompanying understanding and skill will be worthless for you later on. You need a solid foundation upon which future math classes (Calc III, Differential Equations, etc.) and the classes of your majors can build. To this end, please read the textbook sections carefully and watch and study the lectures and lecture notes which I created for you, very attentively. I invested a lot of time preparing this material for your use. You might want to download the videos before you watch them, since the files are very large! Having a working knowledge of Calculus requires that you have the definitions and theorems in your mind and are able to write them down correctly from memory and with understanding. In addition, you need to be able to apply them correctly and understand under which conditions they can be applied.
3. **Assignments:** Homework is the personal responsibility of each student. It is necessary to complete all homework assignments to master the concepts of this course. Each course section has a list of suggested exercises. You are not required to submit your homework, so it is entirely up to you to gauge whether or not you need to do more. A good standard is if you seem to be understanding a group of problems really well and continue to get the correct answer (the answers to the odd problems are the end of the book), then jump to the next group of problems; on the flip side, if you complete all of the odd problems and still feel like you need more practice in that problem group, start working the evens. In order to have more feedback on the correctness of your solutions to the exercises, upon request I will post solutions to the assigned problems a couple days after they are due.
4. The presentation of the solutions needs to include the justification of each major logical and computational step by referring to the corresponding theorems, definitions etc., allowing this step. The style of your written solutions should be very much like that of a textbook example of the examples solved in the lectures. For our learning, applying the techniques introduced correctly is more important than the numerical result. Solutions need to contain enough explanations and references to the respective theorems/definitions to document that you understand the new material. Generally, it is inadequate to merely write down a final answer. This is in particular important for the solution of the exam questions! I would like to encourage you to do extra exercises practicing concepts and techniques you are struggling with for extra credit. If you do twice as many exercises than assigned, you can earn up to 5% extra credit.
5. You are not required to submit your homework, but will be asked on the corresponding exams to report on its completion in percent [(# completed exercises / # assigned exercises) *100]. Note that the extra credit portion of your homework scores will only be collected in Canvas. At the end of class, I will export the data into a spreadsheet and apply the extra credit.
6. **Exams:** There will be 2 midterm exams and a comprehensive final exam. The final exam for this course will be available during the final week. Failure to take the final exam will result in a grade of UW or E (based on last date of attendance) for the course regardless of other grades. It is University policy that no one will be permitted to take a final exam early.

7. **Grading:** Assignments and Quizzes 10%, 2 Midterm Exams 60%, Final Exam 30%. The course uses the following grading scale:

A	≥ 93%	B	83% — 86%	C	73% — 76%	D	63% — 66%
A-	90% — 92%	B-	80% — 82%	C-	70% — 72%	D-	60% — 62%
B+	87% — 89%	C+	77% — 79%	D+	67% — 69%	E	< 60%

Required or Recommended Reading Assignments

Carefully study the textbook chapters listed below. You are encouraged to also carefully watch the lectures and study the corresponding lecture notes.

General Description of the Subject Matter of Each Lecture or Discussion

Chapter 2: Applications of Integration
2.1 Area between curves, 2.2 Determining volumes by slicing, 2.3 Volumes of Revolution: cylindrical shells, 2.4 Arc length and surface area, 2.5 Physical applications

Chapter 3: Techniques of Integration
3.1 Integration by parts, 3.2 Trigonometric integrals, 3.3 Trigonometric substitution, 3.4 Partial fractions, 3.5 Other strategies for integration, 3.6 Numerical integration, 3.7 Improper integrals

Chapter 5: Sequences and Series
5.1 Sequences, 5.2 Infinite series, 5.3 The divergence and integral tests, 5.4 Comparison tests, 5.5 Alternating series, 5.6 Ratio and root tests

Chapter 6: Power Series
6.1 Power series and functions, 6.2 Properties of power series, 6.3 Taylor and Mclaurin series, 6.4 Working with power series

Chapter 7: Parametric Equations and Polar Coordinates
7.1 Parametric Equations, 7.2 Calculus of parametric curves, 7.3 Polar coordinates, 7.4 Area and arc length in polar coordinates

Required Course Syllabus Statements

Generative AI

The use of generative AI tools is not permitted in this course.

Using Remote Testing Software

☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX
Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation
UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.