MATH-153 Calculus II

Spring 2021 | Online | 4 Credits
January 14, 2021 – May 3, 2021

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Office Hours: Monday-Friday 4:00-5:00 PM Mountain Time

COURSE DESCRIPTION

Continuation of Mathematics 152; a study of transcendental functions, integration techniques, Taylor series approximations, calculus in polar coordinates, vectors, calculus of vector valued functions and applications of calculus.

OVERVIEW

We will begin with a review of basic integration techniques before examining more advanced algebraic techniques, as well as applications of the integral. We will then transition to an exploration of function approximation via sequences and series be- fore wrapping up with an introduction to vectors and three-dimensional analytic geometry.

LEARNING OUTCOMES

In this class we will be learners and explorers of mathematics. At the end of the semester, you will be able to

1. Demonstrate mastery of the mathematical concepts which have driven the development of our understanding of the inner workings of Creation and technology over the past 400 years. (CS)
2. Learn how to work with and apply techniques of integration, sequences and series, and vectors using the standard algorithms of calculus (CS).
3. Develop grit and perseverance in solving challenging problems (CD).
4. Grow as an independent learner. (CR)
5. Reflect on mathematics and justice issues in education from a Reformed Chris- tian perspective. (RO)

Coordinates of the Dordt University Educational Framework: RO = Religious Orientation, CS = Creational Structure, CD = Creational Development, CR = Contemporary Response

REQUIRED MATERIAL AND TEXTS

Required Texts/Resources

1. Your required texts for this course are both available as open source etexts:
    a. Boelkins, M., Austin, D., & Schlicker, S. (2020). *Active calculus*. Grand Valley State University.

b. Schlicker, S., Austin, D., & Boelkins, M. (2020). *Active calculus - Multivariable*. Grand Valley State University.

2. Edfinity: We will make daily use of the activities in Edfinity content.
   - Access to the Edfinity online exercises can also be purchsed directly through the Canvas course ($17) by clicking on the first Edfinity online exercise in Week 1. (You will need to click on the button to load the assignment/tool in a new window.)
   - All Edfinity exercises will be accessed directly through Canvas assignments. For an optimal user experience, upgrade to the latest version of Google Chrome or Firefox on a Windows/Mac computer. Other browsers like Safari and devices like Chromebooks can cause issues when you access Edfinity via Canvas.

Laptop

You will routinely use your laptop to complete online homework assignments. We will occasionally use laptops in class - I will give you advanced notice when you need to bring your laptop to class! It is expected that you use the computers as part of the class: not to check your email, Facebook, do assignments for other classes, etc. etc. Consistent distractions caused by technology will result in a drop of your final grade.

Calculator

You may use a calculator during class and when completing your online homework, but calculators will not be allowed on exams.

PROCTOR REQUIREMENT

For this course you are required to have a proctor to facilitate chapter exams. The exams will be sent to this proctor and this person will observe you taking these assessments and hold you accountable for not using a graphing calculator or other resources. You will then scan your completed exam under the supervision of your proctor to submit to Canvas.

If you are in high school, please ask a teacher, administrator, or school counselor. If you are in college, you probably have a testing center that can help. Otherwise, ask your advisor who you should ask. If you are homeschooled, email me and we will discuss your best option. Your proctor should have an official school email address.

You are responsible for communicating with your proctor about when and where you will meet to take the quizzes. **Once you have a proctor, please tell me about them by filling out the form provided in Canvas no later than Thursday, January 21.**

ASSESSMENT

Grading Scheme

Your grade in the class will be assigned based on the weighted average of the five categories below. Each of these categories are described in more detail below.

5%	Preview and Collaboration Activities
25%	Online Homework
10%	Journals
50%	Chapter Exams
10%	Final Exam

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
% Needed	94%	90%	87%	84%	80%	77%	74%	70%	67%	64%	61%

Preview Activities

Prior to the class period during which we start a new section, you complete a guided inquiry assignment to introduce you to the topics from the section. Theses assignments will include reading the textbook, watching some videos, and completing a short assignment that will be submitted on Canvas.

Online Homework

You will complete an assignment on Canvas to help you practice the skills needed to master the learning targets.

Journals

You will be asked to spend time thinking about some component of the course (sometimes the content of the course, sometimes the structure of the course) and to write/sketch several reflections.

Chapter Exams

At the end of each chapter, you will take an exam over the content from that chapter. Review guides for each exam will be provided prior to the exam. Due to their brevity, Chapter 7 and Polar Coordinates will be combined into one exam. The rest of the chapters (5, 6, 8, and 9) will each be their own exam.

Final Exam

The final exam will be comprehensive. It will consist of five "mini" chapter exams (you each get to choose which chapter you skip). If you do not take the final, you will receive an F in the course.

MAKE-UP POLICY

I expect you to make every effort to submit each assignment by its due date. However, life and other classes can get in the way and interfere with your ability to complete the assignments on time. Because of this, you have a 24-hour grace period around each assignment that will not impact your participation in class (Online Homework, and Journals) during which you may submit the assignment with *no questions asked.* If you feel you need more time beyond this, reach out to me as soon as you can or as soon as you feel comfortable and we can discuss it. Generally, nothing will be accepted after that 24-hour period. Preview Activities will not be accepted late and you may not make them up. Make-up tests will only be allowed for students who have a substantiated excuse approved by the instructor *before the date of the test*. Communication is key. If work is late it will be graded as a 0, unless you have discussed it with me before the due date.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Students who require assistance or accommodations based on the impact of a documented disability must contact the Coordinator of Services for Students with Disabilities to access accommodations: Mrs. Marliss Van Der Zwaag, Office: L168 (AEC), Phone: ext. 6490, Email: marliss.vanderzwaag@dordt.edu.

ACADEMIC INTEGRITY

Dordt University is committed to developing a community of Christian scholars where all members accept the responsibility of practicing personal and academic integrity in obedience to biblical teaching.

For students, this means not lying, cheating, or stealing others' work to gain academic advantage; it also means opposing academic dishonesty. Students found to be academically dishonest will receive a minimum of a 0 on the assignment in question. If a student is found to be academically dishonest again, the student will be dropped from the course. Any academic dishonesty will be reported to the Student Life Committee for possible institutional sanctions (from a warning to dismissal from the university). Appeals in such matters will be handled by the student disciplinary process.

CLASS SCHEDULE & ASSIGNMENTS

Week	Topic	Assignments:
Week 1: Jan 14-18	Introduction and Integration Review	Section 5.3 • Preview 5.3 Preview & Collaborative Activities • Edfinity Demo • Edfinity: 5.3 Journal 1 Proctor Information
Week 2: Jan 19-25	Integration by Parts, Algebraic Antiderivatives	Section 5.4 • Preview 5.4 Preview & Collaborative Activities • Edfinity: 5.4 • Proctor Information Section 5.5 • Preview 5.5 Preview & Collaborative Activities • Edfinity: 5.5 Integration Review Sheet
Week 3: Jan 26-Feb 1	Numerical Integration, Chapter 5 Exam	Section 5.6 • Preview 5.6 Preview & Collaborative Activities • Edfinity: 5.6 Chapter 5 Exam
Week 4: Feb 2-8	Using Definite Integrals to Find Area, Length, and Volume	Section 6.1 • Preview 6.1 Preview & Collaborative Activities • Edfinity: 6.1 Section 6.2 • Preview 6.2 Preview & Collaborative Activities • Edfinity: 6.2
Week 5: Feb 9-15	Density Mass, Center Mass, and Physics Applications	Section 6.3 • Preview 6.3 Preview & Collaborative Activities • Edfinity: 6.3 Section 6.4 • Preview 6.4 Preview & Collaborative Activities • Edfinity: 6.4
Week 6: Feb 16-22	Improper Integrals, Review, Ch 6 Exam	Section 6.5 • Preview 6.5 Preview & Collaborative Activities • Edfinity: 6.5 Journal #2 Chapter 6 Exam
Week 7: Feb 23-Mar 1	Polar Coordinates and Differential Equations	Polar Coordinates Worksheet 1 Polar Coordinates Worksheet 2 Section 7.1 • Preview 7.1 Preview & Collaborative Activities

		• Edfinity: 7.1
Week 8: Mar 2-8	Differential Equations	Section 7.2 • Preview 7.2 Preview & Collaborative Activities • Edfinity: 7.2 Section 7.3 • Preview 7.3 Preview & Collaborative Activities • Edfinity: 7.3 Section 7.4 • Preview 7.4 Preview & Collaborative Activities • Edfinity: 7.4
Week 9: Mar 9-15	Modeling with Differential Equations; Review; Ch 7 Exam	Section 7.5 • Preview 7.5 Preview & Collaborative Activities • Edfinity: 7.5 Chapter 7/Polar Coordinates Exam
Week 10: Mar 16-22	Sequences and Geometric Series	Section 8.1 • Preview 8.1 Preview & Collaborative Activities • Edfinity: 8.1 Section 8.2 • Preview 8.2 Preview & Collaborative Activities • Edfinity: 8.2 Section 8.3 • Preview 8.3 Preview & Collaborative Activities • Edfinity: 8.3
Week 11: Mar 23-29	Alternating Series, Taylor Polynomials, Power Series	Section 8.4 • Preview 8.4 Preview & Collaborative Activities • Edfinity: 8.4 Section 8.5 • Preview 8.5 Preview & Collaborative Activities • Edfinity: 8.5 Section 8.6 • Preview 8.6 Preview & Collaborative Activities • Edfinity: 8.6
Week 12: Mar 30-Apr 5	Review, Ch 8 Exam	Journal #3 Chapter 8 Exam
Week 13: Apr 6-12	Functions of Variables, Vectors, and Dot Products	Section 9.1 • Preview 9.1 Preview & Collaborative Activities • Edfinity: 9.1 Section 9.2 • Preview 9.2 Preview & Collaborative Activities • Edfinity: 9.2 Section 9.3 • Preview 9.3 Preview & Collaborative Activities • Edfinity: 9.3
Week 14: Apr 13-19	Vector Cross Product, Lines and Planes in Space, Vector Functions	Section 9.4 • Preview 9.4 Preview & Collaborative Activities • Edfinity: 9.4 Section 9.5 • Preview 9.5 Preview & Collaborative Activities • Edfinity: 9.5

		Section 9.6 • Preview 9.6 Preview & Collaborative Activities • Edfinity: 9.6
Week 15: Apr 20-16	Vector Functions, Derivatives of Vector-Valued Functions, Arc Length and Curvature	Section 9.7 • Preview 9.7 Preview & Collaborative Activities • Edfinity: 9.7 Section 9.8 • Preview 9.8 Preview & Collaborative Activities • Edfinity: 9.8 Journal #4
Week 16: April 27-May 3	Review, Final Exam	Chapter 9 Exam Final Exam