

Calculus III: Math 252

Spring 2020

Schedule Number 22288, 22289, 22290, and 22291

Last Updated: 2020/11/22

COURSE INFORMATION

Class Days:	MWF	Instructor:	Dr. Bo-Wen Shen
Class Times:	11:00-11:50 am	Phone:	619-594-5962
Class Location:	PS130	Email:	sdsu.math252.shen@gmail.com
Mode of Delivery:	Lecture	Office Location:	GMCS-569
		Office Hours:	1:30-2:30 pm MW

- Materials and scores are available at Blackboard and Webassign.

COURSE MATERIALS

Materials	Required or optional	Where and how it can be obtained
Multivariable Calculus, 8th Edition by James Stewart, 2014. Brooks/Cole Cengage Learning		The e-Book is available from webassign.
On-line homework (via webassign)	required	The e-Book is available from webassign.
Lecture Power Point Slides (in PDF)		@blackboard

STUDENT LEARNING OUTCOMES

- Students will learn the following topics: (1) vector vs. scalar; dot products and cross products; (2) vector function; space curve; (3) functions of two or three variables; partial derivatives; tangent planes and linearization; directional derivatives and gradient vector; differentiable functions; (4) multiple integrals (e.g., double or triple integrals); (5) vector fields and line integrals; the fundamental theorem of line integrals; curl and divergence; Green's Theorem; Stokes' Theorem; Divergence Theorem.
 - Outcome 1: (a) Understand the following concepts: inner product, cross product, projection, tangent vector, and normal vector in Chapters 12 and 13; (b) Learn how to summarize them into one ppt slide per Chapter.

Assessment Strategy: Homework, Quiz I, & Mid Term Exam I.

- Outcome 2: (a) Understand the following concepts: total differential, tangent plane approximation, chain rule, directional derivatives, extrema and critical points (with zero gradient), and Lagrange multiplier for optimizations; (b) Learn how to identify one formula to summarize each of major sections in Chapter 14:

Assessment Strategy: Homework, Quiz II, & Mid Term Exam 2.

- Outcome 3: Learn how to compute multiple Integrals in different coordinate systems and understand the concept of Jacobian for Chapter 15.

Assessment Strategy: Homework & Quiz III

- Outcome 4: (a) Understand the following concepts: gradient, curl, divergence, the fundamental theorem of line integral, two forms of Green's theorems (and their relationship to Stokes' theorem and Divergence Theorem); (b) Learn how to summarize the above concepts into one ppt slide for Chapter 16.

Assessment Strategy: Homework, Reading Assignment (of Supplemental materials) & Final exam.

- Students will learn how to apply the above topics to engineering and science fields or economics. Examples include visualizations of flows in 2D or 3D flows.
- Students will learn the relation of the above topics to machine learning methods, including: (1) Distance formula and contour line (Sec. 12.1 + Sec. 14.1) vs. Support Vector Machine (SVM); (2) Linear models and linear approximation (Sec. 14.4) vs. linear classification (as well as regression); (3) Chain rules (Sec. 14.5) vs. back propagation and optimization of neural networks; (4) gradient vectors (Sec. 14.6) vs. steepest decent method; (5) Max and min and second (partial) derivatives (Sec. 14.7) vs. optimization (Hessian matrix); and (6) Lagrange multipliers (Sec. 14.8) vs. regularization coefficients.

ENROLLMENT INFORMATION

- Prerequisites: Mathematics 151 with minimum grade of C

COURSE DESIGN AND ASSESSMENTS

Lectures are given with derivations on the whiteboard and outlines and notes through the projector. There are weekly homework, three quizzes, two mid-term exams, and one final exam, as listed below.

- Class Attendance: Students are required to attend all class meetings including discussion sections. The class attendance will be taken randomly.
- Make-up exams: Missed quizzes or exams can only be made up in the case of a University approved absence.
- Weekly homework will be posted by 5:00 pm every Wednesday, and will be due at 11:59 pm next Friday. The worst homework grade will be dropped.

GRADING POLICIES

You will be guaranteed the following grades as given by your percentage score on the homework, quizzes, midterms, and final exam.

- Weekly homework: 20%
- (Pop) Quizzes I & II (2.5%, 2.5%) 5%
- Mid Term 1 (Feb. 21, F): 20%
- Mid Term 2 (Mar. 27, F): 20%

- On-line Quiz III: 5%
- Final Exam (May 11, M): 30%

A 90%	B 80%	C 70%	D 60%
A- [89%, 90%)	B+ [85%, 89%)	C+ [75%, 79%)	D+ [65%, 69%)
	B [80%, 85%)	C [70%, 75%)	D [60%, 65%)
	B- [79%, 80%)	C- [69%, 70%)	D- [59%, 60%)

SCHEDULE

- Jan. 22 (Wed): First day of Classes
- Jan. 22 (Wed): First day of Class Math 252
- Jan. 31 (Fri): Last day for faculty to drop students from classes
- Feb. 4 (Tue): Last day to officially withdraw from the university without penalty fee for spring semester 2020
- Feb. 21 (Fri): Mid Term 1
- Mar. 23 (Mon): Last day to officially withdraw from all classes for spring 2020 and receive a prorated refund (withdrawal after Feb. 4 requires special approval and a penalty fee is assessed)
- Mar. 27 (Fri): Mid Term 2
- March 30 – April 3: Spring Break
- Apr. 20, 22, or 24: (On-line) Quiz III
- May 7 (Thur): Last day of classes before final examinations
- May 11 (Mon): Final Exam (10:30-12:30)
- May 22 (Fri): Grades due from instructors. (11 p.m. deadline.)

UNIVERSITY POLICIES

Accommodations: If you are a student with a disability and are in need of accommodations for this class, please contact Student Ability Success Center at (619) 594-6473 as soon as possible. Please know accommodations are not retroactive, and I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Ability Success Center. Your cooperation is appreciated.

Student Privacy and Intellectual Property: The [Family Educational Rights and Privacy Act](#) (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. I will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

Religious observances: According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

Medical-related absences: Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. Student Health Services (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the Student Ability Success Center.

SDSU Economic Crisis Response Team: If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit sdsu.edu/ecrt, email ecrt@sdsu.edu, or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

Resources for students: A complete list of all academic support services--including the Writing Center and Math Learning Center--is available on the Student Affairs' Academic Success website. Counseling and Psychological Services (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

Academic Honesty: The University adheres to a strict policy prohibiting cheating and plagiarism. Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;
- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation,

suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

Classroom Conduct Standards: SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:

- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University, or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
 1. physical abuse, threats, intimidation, or harassment.
 2. sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.

COURSE OUTLINE

Chapter	Sections	Remarks
12: Vectors and The Geometry of Space		~ 2 weeks
	12.1 3D Coordinate Systems	
	12.2 Vectors	
	12.3 The Dot Product	
	12.4 The Cross Product	
	12.5 Equations of Lines and Planes	
	12.6 Cylinders and Quadric Surfaces	
13: Vector Functions		~ 2 weeks
	13.1 Vector Functions and Space Curves	
	13.2 Derivations and Integrals of Vector functions	
	13.3 Arc Length and Curvature	
	13.4 Motion in Space: Velocity and Acceleration	
14: Partial Derivatives		~ 3 weeks
	14.1 Functions of Several Variables	
	14.2 Limits and Continuity	
	14.3 Partial Derivatives	
	14.4 Tangent Planes and Linear Approximations	
	14.5 The Chain Rule	
	14.6 Directional Derivatives and the Gradient Vector	
	14.7 Maximum and Minimum Values	
	14.8 Lagrange Multipliers	
15: Multiple Integrals		~ 3 weeks
	15.1 Double Integrals over Rectangles; Iterated Integrals	
	15.2 Double Integrals over General Regions	
	15.3 Double Integrals in Polar Coordinates	
	15.4 Applications of Double Integrals	
	15.5 Surface Area	
	15.6 Triple Integrals	
	15.7 Triple Integrals in Cylindrical Coordinates	
	15.8 Triple Integrals in Spherical Coordinates	
	15.9 Change of Variables in Multiple Integrals	
16: Vector Calculus		~ 3.5 weeks
	16.1 Vector Fields	
	16.2 Line Integrals	
	16.3 The Fundamental Theorem for Line Integrals	
	16.4 Green's Theorem	
	16.5 Curl and Divergence	
	16.6 Parametric Surface and Their Areas	
	16.7 Surface Integrals	
	16.8 Stokes' Theorem	
	16.9 The Divergence Theorem	
	16.10 Summary	