

**Mathematics Department
Siena Heights University**

I. MAT 292: Multivariable Calculus 4 sh

II. Prerequisite: MAT181 and MAT182 (Calculus I and II)

II. Course Description: As the title of this course implies, we will be covering calculus topics in more than just the two dimensional plane. These include basic differential equations, parametric and polar equations, 3 dimensional geometry, partial differentiation, multiple integrals, and vector calculus.

There will be an emphasis of the effective use on technology including the TI-nspire and MAPLE.

III. Instructional Materials:

- **Text:** *Single Variable Calculus, 7th ed*, Stewart, Cengage Learning. ISBN: 9780538498678
- **Technology/software:**
 - TI-nSpire Graphing Calculator will be used in class and the recommended calculator for the class. Math majors should have the CAS version for future classes.
- **Loose-leaf** binder for assignments, handouts and projects is extremely convenient

IV. Resources available for learning

- Math Tutoring Lab: Science 26
- Classnotes and other resources will be available on line
- Canvas: You should find this course when you log into Canvas. Your grades and assignments will be recorded here. You will be given instruction to log on the first day of class.

V. Methods of Instruction:

In class students will be introduced to the concepts, theories and applications of calculus via presentations, activities, reading and practice. Working examples, activities, and projects will develop skills in problem solving and computation. Expect many short quizzes, assessing your understanding of homework assignments. Students will keep a notebook of worked examples and written homework assignments. Students are expected to be active participants in discussions. Successful completion of this course requires substantial out of class study time (the “Rule of Thumb” is 2-3 hours outside of class for every hour in class). Hence, PLAN on studying 6-9 hours a week for this class. There are no exam make-ups without prior approval. Students are encouraged to form study groups. I love quizzes!

Methods of Evaluation Student Achievement/Progress

Method	Percent
Assignments, quizzes,	30
Exams (4-5)	50
Final Exam (comprehensive)	20

Assessments are judged by the following scale:

90% - 100%	A	Outstanding scholarship
80% - 89%	B	Substantially above average scholarship
70% - 79%	C	Average, competent scholarship
60% - 69%	D	Below average scholarship
Below 60%	E	Insufficient scholarship to warrant a passing grade

Topics covered in this course will include:

Unit 1

Separable Differential Equations

Direction Fields and Euler's Method
Parametric and Polar Equations with areas and arc lengths

Unit 2

Equations for Lines and Planes in 3-D
Dot and Cross Product with applications
Derivatives of Vector-valued functions with arc length

Unit 3

Partial Derivatives with applications
Directional Derivatives
LaGrange Multipliers with Applications

Unit 4

Double and Iterated Integrals with applications of surface area
Triple Integrals with applications of Volume

Unit 5

Vector Fields
Line Integrals, including the Fundamental Theorem for Line Integrals
Green's Theorem

VI. On getting through the course

1. The Mathematics Tutoring Lab (Science 26... **264-7882**) will be staffed by "Work-study math tutors", some of whom will tutor Multi-variable Calculus. A schedule will be posted outside Science 26. Please be prepared when requesting help. The tutors will **not** do your homework for you, nor will they read the text for you. They are very happy and willing to help students who have put some effort into their work prior to coming for support.
2. Successful completion of this course requires a substantial amount of out of class study. [Recall, 2-3 hours outside of class for every hour in class]. Students are encouraged to form study groups. Homework is assigned every class period and it is expected to be completed before the next class period unless otherwise stated.
3. **Complete honesty is expected in written work with proper acknowledgements to sources.** Any student engaged in any act of academic dishonesty may receive a failing grade and reported to the appropriate university authorities. Honesty with oneself and with others is of utmost importance in life. The work you do in this course should reflect your honesty and integrity. In practical terms, this means that you should be honest with yourself about how much time you spend on homework, how well you understand the material, and the level of reliance you have on others to complete the assignments. For example, you are encouraged to work with others on homework; merely copying someone else's work and turning it in as your own does not enhance your understanding and is dishonest. If you do work with others on the homework, write down on your assignment the names of the students you worked with. If there is clear evidence that a student has committed fraud to advance his/her academic status (for example, cheating on an exam or quiz), your instructor will be obliged to deal with the matter in accordance with the Academic Dishonesty Policy found in the SHU Undergraduate Catalog. If you are aware of such activity by another student in the course, you should bring the matter to your instructor's attention immediately.

- VII. Cell Phones:** TURN THEM OFF! Students are not allowed to use cell phones in mathematics classes. Please turn them off as you enter the classroom and keep them stored out of sight in your backpack or pocket.

VIII. SHU General Education Learning Outcomes.

The general education learning outcomes (see page 10 of the undergraduate catalog) receiving major emphasis in this course are C1 and B3. The writing required for activities and data projects address C1 while homework assignments and quizzes address B3.

IX. Department Learning Outcomes:

The Mathematics Department has identified the following five learning outcomes to be achieved by majors and minors in its program.

1. Students will read and understand mathematics, differentiating between correct and incorrect mathematical reasoning.
2. Students will effectively communicate mathematics to others, both in writing and speaking.
3. Students will demonstrate abilities to work independently and in-groups to develop mathematical models using appropriate technologies.
4. Students will demonstrate a mathematical maturity leading to independent investigations, increased responsibility for learning, and participation in the professional mathematics community.
5. Students will demonstrate mastery of the content of the courses required for the major including the calculus, foundations, algebra, and analysis.

X. Students with Disabilities

In accordance with University policy and the equal access laws, I am available to discuss appropriate academic accommodations that you may be eligible for as a student with a disability. Please contact me for an appointment to discuss possible accommodations. Students must register with the Office for Students with Disabilities for disability verification and determination of reasonable accommodations. Requests for accommodations must be done in a timely manner and are not retroactive. The OSD is located in Sacred Heart Hall in room 303.

ACCOMMODATIONS POLICY FOR STUDENTS WITH DISABILITIES

Section 504 of the Rehabilitation Act of 1973 (Section 504), prohibits discrimination on the basis of physical or mental disability (29 U.S.C. Section 794). Siena Heights University is committed to furnishing appropriate auxiliary aids and services where necessary to afford any student with a disability an equal opportunity to participate in, and enjoy the benefits of, a service, program, or activity conducted by a public entity.

An academically qualified (has met admission standards) student with a disability who is in need of auxiliary aids/services is obligated to provide detailed documentation of the nature of the disabling condition to the Office of Disability Resources (303 Sacred Heart Hall/ 517 264-7683). The student will discuss with the coordinator of the ODR how the disability impacts performance in the academic setting. The student should initiate this process at the beginning of the semester, so that accommodations may be arranged before the student experiences difficulty. This process is not retroactive-a student may not disclose a disability in order to retake a failed test. Once appropriate accommodations/services have been determined, the student presents a Letter of Accommodation (provided after consultation with the coordinator of the ODR) to his/her course teaching staff and discusses a plan for implementing the accommodation/service.