

# Course Syllabus for Multi-Variable Calculus MAT4833 (MATH 267—BSU Dual Credit)-Live Class

## General:

Instructor: Dr. Michael Niemeier

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Day/ Time: MWRF 10 AM

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## Required materials:

- *Calculus: Early Transcendentals*, 7<sup>th</sup> edition, by James Stewart. Brooks/Cole, 2012. ISBN 978-0-8400-5885-0.
- Texas Instruments TI-89 or TI-nSpire graphing calculator; Mathematica Software

Pre-requisite: C- or better in MAT4134 (BSU--MATH 166) or permission of the department chairperson.

## Course Description:

Multidimensional calculus and its applications. Topics include three-dimensional vector calculus, Gauss's theorem, Green's theorem and Stokes' theorem. The course includes the use of graphing calculators and computer software

## Course Objectives:

This course extends the study of calculus to the multivariate realm. As the material becomes more complex and subtle, the student is expected to gain skills in abstraction and application of calculus to a wide variety of situations. Available technology such as graphing calculators and computer software will allow the student to carefully examine the intricate generalization of calculus to a multivariate setting.

## Course Content:

- **parameterize lines**, curves (also with unit speed), planes and surfaces given in terms of various geometric data; **find** distances between lines and planes; **sketch and recognize** curves, surfaces and solids in various coordinate systems (Cartesian, polar, cylindrical, spherical);
- **calculate and geometrically interpret** dot and cross products; velocity and length of curves in space; partial derivatives (using the multivariable chain rule if necessary); tangent planes and total differentials; gradient vectors; curl and divergence;
- **evaluate** limits of functions in two variables; double and triple integrals, if necessary, by changing the order of integration, by changing to other coordinate systems (polar, cylindrical, spherical) and by multivariate change of variables; line integrals (both types) by direct calculation (if necessary) and by way of fundamental theorem (in conservative

fields);

- **optimize** functions of several variables (given explicitly or described in story problems) by using the first and second derivative tests and by using Lagrange multipliers;
- **compute** physical quantities such as work, total mass, volume, surface area, center of mass, centroid, and moment of inertia of an object using integrals of the appropriate type and dimension;
- **determine** by partial differentiation and from graphical information whether or not a given vector field is conservative;
- **state, work out and interpret** both sides of the three major vector calculus theorems (Gauss, Stokes, Divergence).

### Grading:

Grades for the course and assignments are assigned by the following percentages:

	100-93 — A	92-90 — A-
89-88 — B+	87-83 — B	82-80 — B-
79-78 — C+	77-73 — C	72-70 — C-
<70 — D*		

The final grade in the course will be determined by the following factors:

Homework:	10%
Quizzes:	10%
Midterm exams:	60%
Final Exam:	20%

### Assignments:

For nearly every section, there will be a homework assignment. Homework will be collected on a regular basis and checked for both completeness and accuracy. Expect quizzes on a near weekly basis that will cover material discussed the previous two weeks in class. Depending on the number of quizzes, I will drop up to the lowest three scores from consideration for the overall quiz grade. At the end of each chapter or couple of chapters, there will be a midterm exam covering that material. Finally, at the end of the course, you will have a final exam that will encompass all the material presented during the semester. As the final exam is cumulative, its score will be used to replace one lower midterm exam score throughout the semester.

## Academic Integrity:

As a firm believer that grades should reflect learning, academic integrity is paramount to the academic experience. Please review the Academy's Academic Integrity policy as it will be strictly adhered to in my class.

Examples of behavior subject to review under the Academic Integrity policy include, but are not limited to:

- 1, Copying someone's work and turning it in as one's own
- 2, Use of aids and/or other materials on quizzes and exams without expressed permission.
- 3, Use of calculators when explicitly forbidden to do so.
- 4, Copying another person's work or answers on a quiz or exam.

I encourage you to work in groups when doing the homework assignments as much can be learned from your peers that you may not always pick up in class. However, each individual is required to turn in work in their own handwriting accompanied by the requisite work shown to receive full credit.

## Technology:

The use of technology is limited to that which will enhance the learning process. Use of laptops is permitted as long as it is not distracting from what is transpiring in the classroom. Calculators, though not required, are welcome to be used for the majority of homework, quiz, and exam assignments. It is strongly recommended that you familiarize yourself with the model's of calculator listed above. We will also be using Mathematica Software (see Canvas for access information) solve problems and model concepts discussed in class. This includes 3-D graphing and multiple integrals.

## Attendance:

Attendance will be taken at the beginning of the hour. You are responsible to be on time for each class period. Arrival within the first 10 minutes of class will constitute a tardy, otherwise you will be marked absent. Failure to attend class will result in disciplinary action as set forth by Academy policy regarding absences and tardies.

## Indiana Academy Unexcused Absence Policy

It is the policy of the Indiana Academy that any absence from class is unexcused, except for illness, death in the family, college or school-related activities, and extenuating circumstances. When a student is absent from a class, the instructor reports the student absence to the Faculty Attendance Coordinator in the Office of Academic Affairs. Unless the absence is excused by a school official, it is considered unexcused. The decision as to whether an absence is excused is not determined by the instructor.

You are expected to attend every class. You are allowed one unexcused absence without penalty. Each additional unexcused absence will be penalized as follows: Unexcused absence (2) = 1-point subtraction from final grade. Unexcused absence (3) = 3-point subtraction from final grade. Unexcused absence (4) = 5-point subtraction from final grade. (For example, if you have an 89 final average with (4) unexcused absences your final grade will be 84). Five or more unexcused absences will lead to academic and residential consequences beyond the scope of this class determined by the Office of Academic Affairs (i.e., residential groundings, parent/principal conference, and/or detention).

### Late Work/ Make-up policy:

It is my policy not to accept late work/ allow make-up work on homework or quizzes unless there is an excused absence the day an assignment was due. If you can't be in class the day an assignment is due, please bring it by my office or send me an email with it as an attachment. If you miss a quiz or exam due to an excused absence, it is up to you to schedule a time with me (office hours or other) during which you can take the exam or quiz. You must contact me within a week of the missed assignment and complete the assignment within two weeks or it will be recorded as a zero. If you miss an exam due to an unexcused absence, it is up to you to schedule a time with me (office hours or other) to take the quiz or exam with a 10% penalty applied to the grade. For unexcused absences you must contact me and complete the assignment within one week otherwise it will be recorded as a zero.

\*If you must take a quiz or exam online, then it will be proctored while in a Zoom session. You must contact me the week of a quiz or exam to schedule a time to take the exam over Zoom.

### Office Hours:

My office hours are posted at the top of the syllabus, but if my door is open, feel free to stop by, even if you don't have any specific questions. However, there may be times I have work that must get done, so please don't be offended if I ask you to leave if it is not an official office hour time.

## Institutional Diversity:

Ball State University aspires to be a university that attracts and retains a diverse faculty, staff, and student body. We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse as expressed in our Beneficence Pledge and through university resources found at <http://cms.bsu.edu/campuslife/multiculturalcenter>.

## Mask Policy:

The Indiana Academy will follow [Ball State University's mask policy](#). Effective July 1, 2020, all people on campus—including faculty, staff, students, vendors, contractors, suppliers, and visitors—should wear face masks (covering nose and mouth) while inside campus buildings. Face masks are specifically required in the following situations:

- i. When in the presence of others (indoors or outdoors) and physical distancing is difficult to maintain, such as in hallways, elevators, stairs, public spaces, and common areas;
- ii. When in a classroom or laboratory;
- iii. When using campus transportation (such as a shuttle bus);
- iv. When multiple individuals are in a University vehicle.

Students, faculty, and staff are encouraged to bring their own mask. Masks will be provided to anyone who is unable to bring a mask or their mask is damaged.

## Non-compliance

If a student declines to wear a face mask as required, the student will be referred to the Director of Academic Affairs or the Director of Residential Affairs. If the situation occurs in a classroom or other academic setting, it is considered a classroom management issue, and the teacher will remind the student of the requirement and give the student a chance to comply with it prior to referring the matter to the Director of Academic Affairs or the Director of Residential Affairs. Wearing masks is crucial to preventing the spread of COVID-19 to others.

## Schedule:

Week of	M	W	R	F
3-Jan	Syllabus/ Sec. 12-1	Sec 12.2	Sec. 12.3	Sec. 12.4-Q
10-Jan	Sec. 12.5	Sec. 12.6	Topics in Vectors	Topics in Vectors
17-Jan	MLK Day	Sec. 13.1	Sec. 13.2	Sec. 13.3-Q
24-Jan	Sec. 13.4	Topics in Vectors	Review	Exam 1
31-Jan	Sec. 14.1	Sec. 14.2	Sec. 14.2	Sec. 14.3
7-Feb	Extended	Sec. 14.3	Sec. 14.4	Topics in Par. Der.-Q
14-Feb	Sec. 14.5	Sec. 14.6	Sec. 14.6	Topics in Par. Der.-Q
21-Feb	Sec. 14.7	Sec. 14.8	Review	Exam 2
28-Feb	Sec. 15.1	Sec. 15.2	Sec. 15.3	Topics in Mul. Int.-Q
7-Mar	Spring Break	Spring Break	Spring Break	Spring Break
14-Mar	Sec. 15.4	Sec. 15.5	Sec. 15.6	Topics in Mul. Int.-Q
21-Mar	Sec. 15.7	Sec. 15.8	Sec. 15.9	Topics in Mul. Int.-Q
28-Mar	Sec. 15.10	Top. in Mul Int.-Q	Exam Review	Exam 3
4-Apr	Sec. 16.1	Sec. 16.2	Sec. 16.3	Topics in Vec Calc-Q
11-Apr	Sec. 16.4	Sec. 16.4	Sec. 16.5	Extended
18-Apr	Extended	Sec. 16.6	Sec. 16.7	Topics in Vec Calc-Q
25-Apr	Sec. 16.8	Sec. 16.9	Sec. 16.10	Topics in Vec Calc-Q
2-May	Exam Review	Exam 4	Final Review	Final Review
9-May	Final Exam Week	Final Exam Week	Final Exam Week	Final Exam Week