

MATH 233 – Calculus III COURSE SYLLABUS · FALL 2018

INSTRUCTOR:	Roger Griffiths	OFFICE HOURS:	
OFFICE:	Old Main 305		Mon: 09:00 - 09:50
EMAIL:	rgriffiths@mercyhurst.edu		Tues: 08:50 - 09:20 (in Hirt M207)
PHONE:	824-2123		
CLASS TIME:	Mon, Tues, Wed, Fri: 2:00 - 2:50, (4 semester credits)		Tues: 12:00 - 12:50
LOCATION:	Hirt U305 (Tuesday in Hirt M200)		Tues: 3:00 - 3:50
PREREQUISITE:	Calculus II (C or better)		Thur: 08:00 - 09:20 (in Hirt M207)
WEB:	http://math.mercyhurst.edu/~griff/courses/m233/		
TEXT:	<i>Calculus Early Transcendentals</i> , (10th Edition) by Anton, Bivens, Davis;		Thur: 2:00 - 2:50

TOPICS

This is an introduction to the calculus of several variables. Topics selected from polar coordinates, functions of several variables, partial derivatives, multiple integrals, line integrals, surface integrals, Green's theorem and Stokes' theorem. We will cover sections from Chapters 10-15. The specific sections covered can be found in the tentative course schedule.

LEARNING OBJECTIVES

By the end of this course, you will have acquired many mathematical power tools which include the ability to:

- Graph polar equations and find area using polar coordinates.
- Identify and graph quadric surfaces.
- Convert equations between rectangular, spherical and cylindrical coordinates.
- Compute and apply: limits, partial derivatives.
- Apply the chain rule to functions of n -variables.
- Set up and evaluate double, triple integrals.
- Compute dot products and cross products in 3-space and interpret the results.
- Compute and apply: directional derivatives, the gradient and equation of tangent planes for functions of two variables.
- Find maxima and minima of functions of two variables.
- Set up and evaluate surface and line integrals.
- Apply The Divergence and Stokes' theorems.

TEXTBOOK

Calculus Early Transcendentals, 10th Edition by Anton, Bivens, Davis. You will need this textbook, and be sure to check both the edition and version when purchasing; other editions have similar material, but the assigned problems may be different. Other than a lot of notebook paper and pencils, no other materials are required for this class. You do NOT need to purchase a subscription to WileyPLUS or pay to access any other online resources. If you prefer to purchase an electronic version or the binder version of the text, you're welcome to do so.

CALCULATORS

Graphing calculators are not required or even recommended for this course. While the textbook contains a few problems which involve the use of a calculator or computer, *all of our examinations are carefully designed to be taken "closed book" without the use of calculators, computers or "crib sheets"*. Examination problems will focus on the basic formulas and problem solving techniques which every student of calculus must know without a calculator or textbook. This policy reinforces our stated learning objectives, in particular, furthering our understanding of the language of mathematics. We will be interested in learning and writing mathematics (the process) not in 'the answer'.

HOMEWORK

I do not collect or grade your written homework. You will be held accountable for the mastery of homework problems via the quizzes (which can occur any day). Your goal is to master each type of problem assigned. The quizzes serve as an immediate assessment of the extent to which you mastered a particular assignment.

HOMEWORK SUGGESTIONS

- **Homework is far and away the single most important part of any mathematics course** because this is when most (all) of the learning takes place. Homework problems will be assigned for each class. You are expected to understand each of the suggested homework problems.
- The homework is our 'PRACTICE', and is how you master the material. You will want to practice in the manner you will be assessed. That means *write mathematics*, your focus should not be on 'the correct answer', but rather, what you write as your solution. If you need further help on this important aspect of the class please see the mathematics tutors provided for this class. Please see *Grading Policy* above.

Recall, one of our learning objectives in this class: advancing our ability to *write mathematics*. Remember, the general rule of thumb for a college level class is that one should put in at least 2 hours of work outside class for every hour in class.

QUIZZES

- You will be given quizzes regularly. Keeping up with the homework, as detailed above, will ensure that you are prepared for the quizzes.
- The quizzes will be based largely on the suggested homework, and should be expected any day.
- Everyone is allowed to miss one quiz without penalty (for any reason); thus, there are NO make up quizzes. If you end up taking all of the quizzes, you may drop your low quiz score. Athletes or other individuals missing for school activities are to let me know BEFORE missing the quiz.
- Quiz grades will not be based strictly on whether or not you found the correct answer. Your work must also be written clearly, and with proper notation, to receive full credit.
- The quizzes serve as an immediate assessment of the extent to which you mastered a particular assignment. Good quiz results should serve as positive feedback, but poor quiz results suggest that you must go back and master that material. Repeatedly failing quizzes will almost certainly lead to failing the course, you must take immediate and corrective action if you ever do poorly on a quiz.

EXAMS

- There will be three midterm exams given throughout the semester, in addition to the final exam. The material on the exams will be similar to topics covered on quizzes and homework.

- Students are required to take all exams at the scheduled hour as they appear on the syllabus and course schedule.
- There will be no late 'make-up' exams, as this is unfair to the rest of the class. If you know in advance you are going to miss a scheduled exam, let me know well in advance of the exam. Athletes, carefully review our exam schedule looking for conflicts.
- A missed exam will result in the final exam being worth 300 points (you do not lose any points for the missed exam, those points simply roll into the final exam). A second missed exam will receive a grade of 0 (zero).
- Our goal is not simply a 'correct answer'. But rather, you are to demonstrate the extent to which you understand each problem, this means *write mathematics*. A good write-up includes: connecting your work, proper notation, and an explanation of steps as you see necessary.
- Important Dates to Remember:
 - Exam 1: Friday, September 28th.
 - Exam 2: Friday, November 2nd.
 - Exam 3: Friday, December 7th.
 - Final Exam: FRIDAY, Dec 14th, 1:00-3:00 PM.

COURSE POLICIES

- ✓ You are responsible for all that is announced or covered in class even if you are absent.
- ✓ You are responsible for all the material in a given section unless told otherwise, use the course schedule and suggested homework as a guide.
- ✓ A prerequisite for additional help outside the classroom is regular class attendance.
- ✓ You should establish a *class contact*, that is, a fellow classmate that you may contact in case you are having a problem with a particular homework exercise at night/weekend or in the event you miss class, you can get the class notes from them.
- ✓ If you miss class, you are responsible for getting the notes from your 'class contact' (see above).
- ✓ Email is great for **simple** communications, but more complex issues must be handled in person.

EVALUATION

There will be regular quizzes, three exams, and a cumulative final exam. Homework will be assigned but not collected. We will occasionally discuss the homework in class, but students are expected to clear up questions using my office hours. Quizzes and tests will be closed-book and administered in class. In-class quiz problems will be very similar to the assigned homework problems. The final exam will be cumulative (and worth twice a mid-term exam).

Your letter grade in this course will be based on:

- 100 points: **Quizzes** Quiz average out of 100 points, will drop 1 quiz score
- 300 points: **Exams:** 3 exams at 100 points each
- 200 points: **Final Exam** Comprehensive Final exam worth 200 points
- 600 points: **Total points** in the course

And assigned according to the following scale:

Total Class Points	Percent %	Letter Grade	Interpretation
540 - 600	90 to 100	A	Exceptional
522 - 539	87 to 89	B+	Outstanding
480 - 521	80 to 86	B	Very Good
462 - 479	77 to 79	C+	Good
420 - 461	70 to 76	C	Satisfactory
360 - 419	60 to 69	D	Unsatisfactory
0 - 359	Below 60	F	Failure

- ✓ Your overall performance in the course is measured by the total number of points you accumulate relative to the maximum 600 points possible. Your letter grade in this course will be based on the distribution above, the standard scale used in the Mathematics Department.
- ✓ These are the only points possible in this class, there is no extra credit (or 'make up'), your asking for extra credit is a clear indication that you have not read this syllabus, which you should think of as 'your class contract'.

SERVICES/SUPPORT:

LEARNING DIFFERENCES

Mercyhurst University is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. Students with disabilities requiring accommodations should complete and submit [this form](#) and the required documentation to the Director of Equal Opportunity Programs (DEOP), aagnew@mercyhurst.edu. Accommodations will not be granted prior to approval by the DEOP and will not be provided retroactively. Further information is available by visiting the Learning Differences website: <http://www.mercyhurst.edu/academics/learning-differences-program>.

ASSESSMENT

This course will be used to assess the mathematics program; specifically Student Learning Outcome Mathematics #2: *Set up and solve problems in mathematics modeling the physical world, with justification of each step in the process, and with a determination of the reasonableness of the solution.* This learning outcome will be measured using your final exam. This assessment has no impact on your final grade. Rather, the results of this assessment may be used to modify or enhance our program where needed.

SUPPORT OF THE MERCY MISSION

This course supports the mission of Mercyhurst University by creating students who are intellectually creative. Students will foster this creativity by: applying critical thinking and qualitative reasoning techniques to new disciplines; developing, analyzing, and synthesizing scientific ideas; and engaging in innovative problem solving strategies.

MATH 233 · CALCULUS III TENTATIVE COURSE SCHEDULE · FALL 2018

Monday	Tuesday	Wednesday	Friday
		Aug 22 § 10.2: Polar Coordinates	Aug 24 § 10.4: Conic Sections
Aug 27 § 11.1: Coordinates in 3-Space	Aug 28 § 11.2: Vectors (1)	Aug 29 § 11.2: Vectors (2)	Aug 31 § 11.3: Dot Product; Projections (1)
Sep 3 No Class: Labor Day	Sep 4 § 11.3: Dot Product; Projections (2)	Sep 5 § 11.4: Cross Product (1)	Sep 7 § 11.4: Cross Product (2)
Sep 10 § 11.5: Parametric Equations, Lines	Sep 11 § 11.6: Planes in 3-Space (1)	Sep 12 § 11.6: Planes in 3-Space (2)	Sep 14 § 11.7: Quadric Surfaces
Sep 17 § 13.1: Functions of Two or More Variables	Sep 17 § 13.2: Limits and Continuity	Sep 19 § 13.3: Partial Derivatives	Sep 21 § 13.4: Differentiability, Differentials, Local Linearity (1)
Sep 24 § 13.4: Differentiability, Differentials, Local Linearity (2)	Sep 25 § 13.5: The Chain Rule (1)	Sep 26 § 13.5: The Chain Rule (2) § 13.6: Directional Derivatives (1)	Sep 28 EXAM 1
Oct 1 § Hurst Day	Oct 2 § 13.6: Directional Derivatives (2)	Oct 3 § 13.7: Tangent Planes and Normal Vectors	Oct 5 No Class: Break
Oct 8 § 13.8: Maxima and Minima (1)	Oct 9 § 13.8: Maxima and Minima (2)	Oct 10 § 13.9: Lagrange Multipliers	Oct 12 § 14.1: Double Integrals
Oct 15 § 14.2: Double Integrals over Nonrectangular Regions (1)	Oct 16 § 14.2: Double Integrals over Nonrectangular Regions (2)	Oct 17 § 14.3: Double Integrals in Polar Coordinates (1)	Oct 19 § 14.3: Double Integrals in Polar Coordinates (2)
Oct 22 § 14.4: Surface Area	Oct 23 No Class: Advising Day	Oct 24 § 14.5: Triple Integrals (1)	Oct 26 § 14.5: Triple Integrals (2)
Oct 29 § 14.5: Triple Integrals (3)	Oct 30 § 11.8: Cylindrical and Spherical Coordinates	Oct 31 § 11.8: Cylindrical and Spherical § 14.6: Triple Integrals in Cylindrical	Nov 2 EXAM 2
Nov 5 § 14.6: Triple Integrals Cylindrical and Spherical Coordinates (2)	Nov 6 § 14.6: Triple Integrals Cylindrical and Spherical Coordinates (3)	Nov 7 § 15.1: Vector Fields	Nov 9 § 15.2: Line Integrals (1)
Nov 12 § No Class (electric bill)	Nov 13 § 15.2: Line Integrals (2)	Nov 14 § 15.2: Line Integrals (3)	Nov 16 § 15.3: Independence of Path
Nov 19 § 15.4: Green's Theorem	Nov 20 § 15.5: Surface Integrals (0)	Nov 21 No Class: Thanksgiving	Nov 23 No Class: Thanksgiving
Nov 26 § 15.5: Surface Integrals (1)	Nov 27 § 15.6: Surface Integrals; Flux	Nov 28 § 15.7: The Divergence Theorem (1)	Nov 30 § 15.7: The Divergence Theorem (2)
Dec 3 § 15.7: The Divergence Theorem (3)	Dec 4 § 15.8: Stokes' Theorem (1)	Dec 5 § 15.8: Stokes' Theorem (2)	Dec 7 EXAM 3
		Friday Dec 14	FINAL EXAM 1:00 - 3:00

MATH 233 · SUGGESTED HOMEWORK · FALL 2018

Section	Exercises
§ 10.2: Polar Coordinates	1(a,c,e), 3(a,c,d,f), 5(a,e), 9, 10(b,c), 11, 17, 21, 23, 27, 41
§ 10.4: Conic Sections	1, 5(a), 10, 14(a), 23(a), 25(a)
§ 11.1: Coordinates in 3-Space	3, 11, 15, 25, 27, 31, 37, 39, 47
§ 11.2: Vectors (1)	3, 5, 7, 9, 11, 13, 21, 29
§ 11.2: Vectors (2)	12, 15, 30, 31, 33
§ 11.3: Dot Product; Projections (1)	1, 3, 5, 11, 13, 15(a), 25, 27
§ 11.3: Dot Product; Projections (2)	7, 24, 26, 35, 39, 46
§ 11.4: Cross Product (1)	1, 3, 7, 11, 19, 21
§ 11.4: Cross Product (2)	23, 27, 28, 29, 37
§ 11.5: Parametric Equations, Lines	1(b), 3(b), 7, 9, 17, 21, 29
§ 11.6: Planes in 3-Space (1)	1, 3, 9, 11, 13, 13, 18, 25, 29
§ 11.6: Planes in 3-Space (2)	12, 15, 27, 31, 43
§ 11.7: Quadric Surfaces	1, 7, 10, 23(use Table 11.7.1), 37, 39
§ 13.1: Functions of Two Variables	1(d,e), 11(a), 17(c,e), 19, 23, 26
§ 13.2: Limits and Continuity	3, 5, 7, 9, 13, 15, 16, 17, 37
§ 13.3: Partial Derivatives	5, 16, 25, 29, 31, 35, 37, 39, 43, 49, 85, 91, 95, 101(a)
§ 13.4: Differentiability, Local Linearity (1)	3, 11, 15, 17, 19, 21, 23, 33, 35, 47, 49 (will need a calculator for a few)
§ 13.5: The Chain Rule (1)	1, 2, 3, 5, 17, 19, 25
Exam 1	
§ 13.6: Directional Derivatives (1)	1, 2, 3, 5, 7, 9, 11, 17, 19, 20, 29
§ 13.6: Directional Derivatives (2)	31, 32, 33, 35, 43, 45, 53, 56, 71
§ 13.7: Tangent Planes and Normal Vectors	3, 7, 11, 12, 13, 25, 27
§ 13.8: Maxima and Minima (1)	5, 7, 9, 13, 14, 16, 27
§ 13.8: Maxima and Minima (2)	29, 31, 37, 38, 43
§ 13.9: Lagrange Multipliers	1, 7, 9, 19, 25, 29
§ 14.1: Double Integrals	5, 7, 9, 13, 15, 29, 31, 33
§ 14.2: Double Integrals, Nonrectangular (1)	3, 5, 7, 9, 15, 19, 23
§ 14.2: Double Integrals, Nonrectangular (2)	10, 17, 25, 39, 47, 49, 52, 53, 55
§ 14.3: Double Integrals in polar coord (1)	1, 3, 5, 8, 13, 17, 23, 27
§ 14.3: Double Integrals in polar coord (2)	14, 15, 19, 26, 29, 33

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Section	Exercises
§ 14.4: Surface Area; Parametric Surfaces	1, 3, 6, 11, 15, 29, 35, 39
§ 14.5: Triple Integrals (1)	1, 3, 5, 7, 9, 15
§ 14.5: Triple Integrals (2)	6, 10, 11, 21, 25
§ 14.5: Triple Integrals (3)	16, 17, 23, 26(a,b), 39
Exam 2	
§ 11.8: Cylindrical and Spherical Coord	1, 3, 5, 7, 19, 25, 29, 39, 43
§ 14.6: Triple Integrals in Cylindrical (1)	1, 5, 9, 10, 17
§ 14.6: Integrals Cylindrical and Spherical (2)	3, 7, 13, 14, 19
§ 14.6: Integrals Cylindrical and Spherical (3)	16, 18, 23, 27, 29
§ 15.1: Vector Fields	1, 2, 3, 15, 17, 21, 23, 25, 27, 37
§ 15.2: Line Integrals (1)	1, 13(a,b), 19, 21, 23, 25
§ 15.2: Line Integrals (2)	7, 9, 33, 37, 39, 45, 47, 49
§ 15.3: Independence of Path	1, 3, 5, 7, 13, 17, 23, 27
§ 15.3: Independence of Path § 15.4: Green's Theorem	
§ 15.4: Green's Theorem	1, 3, 7, 9, 11
§ 15.5: Surface Integrals	1, 5, 19, 27, 29
§ 15.6: Surface Integrals; Flux	1, 5, 11, 13, 19
§ 15.7: The Divergence Theorem (1)	1, 3, 9, 13, 15
§ 15.7: The Divergence Theorem (2)	11, 12, 14, 17
§ 15.8: Stokes' Theorem (1)	1, 3, 5, 7
§ 15.8: Stokes' Theorem (2)	
Exam 3	