

Math 17100 Multidimensional Mathematics
Spring 2023 Semester, Section 22866 (MW 10:30-11:45AM, IT069)

Instructor

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Office Hours

1. Monday and Wednesday, 5:30PM - 7PM, Math Assistance Center
2. By appointment in office or over Zoom.

Course Description

This course will be for 3 Credits and is the third course in a 3-course sequence for Math, Science and Engineering majors. Topics include Parametric Equations of Curves and Surfaces, Vectors and the Geometry of Space, Cylindrical and Spherical Coordinates, and basics of Linear Algebra: solving linear systems, matrices, determinants, eigenvalues and eigenvectors.

Prerequisites

MATH 15900 (or MATH15300 and 15400) taken within last 3 terms with at least a C grade.

Lecture Attendance

It is recommended to attend all lectures. Students will be taken at their word when they communicate the reason for missing a class. However, students will be subject to disciplinary action under the Student Code if they are not truthful about the reason for their absence.

Textbook

1. Calculus, 8th Edition, by James Stewart, Thompson Publishing Co.
e-text is available on Canvas.
2. Math 171 Basic Linear Algebra, Bruce Kitchens and Diagrams by Roland Roeder.
Pdf can be found in Module "Syllabus and Policies" on Canvas page of the course.

Calculators and Technology

In all Calculus and Calculus-related courses at IUPUI with numbers MATH16500 or above, no calculators or other forms of technology can be used on in-class, closed-books assessments (quizzes, tests, final). A scientific calculator is strongly recommended for doing homework. However, no calculators are permitted on quizzes, tests or the final examination for this course.

Homework and Quizzes

Homework will be assigned every week. However, it will not be graded. There will be a quiz every Wednesday in the last 10-15 minutes of class, except in the first week and in the last two weeks. **Each quiz is worth 20 points** and there will be a **total of 12 quizzes**. The problems appearing on the quiz will be selected randomly from the homework problems assigned for the previous week.

Tests

There will be **3 tests** (see syllabus timeline). One must get prior permission for a make-up test. No make-ups will be allowed after the test is returned. No technology of any kind can be used on the tests. Note that if use of technology is found during a test, especially cell phones, this will result in a grade of 0 points.

Final Examination

There will be a Common Department Final Exam on Sunday, April 30, 2023 from 1-3 PM.

Grading Policy

| Assignment | Points | Weightage |
|------------|-------------|-----------|
| Quizzes | 240 points | 24% |
| Test 1 | 150 points | 15% |
| Test 2 | 150 points | 15% |
| Test 3 | 160 points | 16% |
| Final Exam | 300 points | 30% |
| Total | 1000 points | 100% |

| Percentage | Grade |
|------------|-------|
| 90% | A- |
| 80% | B- |
| 70% | C- |
| 60% | D- |

No Class Dates (see Syllabus Timeline)

MLK Day, Monday, January 16, 2023

Spring Break, March 11-19, 2023

No Class on May 01, 2023

Dishonesty and Student Misconduct

Cheating will result in a minimum penalty of receiving a grade of F in this course. The IUPUI Department of Mathematical Sciences expects all students to adhere to the regulations put forth in the "IUPUI Code of Student Rights, Responsibilities, and Conduct" concerning academic misconduct or personal misconduct. Procedures for imposing academic and disciplinary sanctions are outlined in the Code. The code can be found on the Office of Student Life and Diversity Help homepage at <https://studentaffairs.iupui.edu/index.html>

Campus-Wide Policies

The campus-wide policies governing the conduct of courses at IUPUI and additional university, campus, and department policies and procedures can be found on Canvas.

AES

Students needing accommodation due to disability will need to register with Adaptive Educational Services (AES) and complete the appropriate forms issued by AES before accommodations are given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling 317-274-3241. Visit <http://aes.iupui.edu/> for more information.

Pandemic

The syllabus, in-person format, timelines and assignments may change with 24 hour notice based on pandemic and university best-practice guidelines. If it becomes necessary, all components of this course will go on-line via Zoom delivery.

Math 17100 Multidimensional Mathematics Syllabus

1. Geometry of \mathbb{R}^2
 - (a) Conic Sections
 - (b) Parametric Equations
 - (c) Polar Coordinates
 - (d) Complex Numbers
2. \mathbb{R}^3 and Vectors
 - (a) Cartesian Coordinates for \mathbb{R}^3
 - (b) Vectors
 - (c) Dot Product
 - (d) Cross Product
 - (e) Lines and Planes
3. Geometry of \mathbb{R}^3
 - (a) Curves in \mathbb{R}^3
 - (b) Solids and Surfaces of Revolution
 - (c) Cylinders and Quadric Surfaces
 - (d) Graphs and Contour Maps for Functions of two Variables
 - (e) Cylindrical Coordinates
 - (f) Spherical Coordinates
 - (g) Parametric Equations for Surfaces
4. Linear Algebra
 - (a) Lines, Planes, Systems of Linear Equations
 - (b) Matrices and Elementary Row Operations
 - (c) Gaussian Elimination
 - (d) Reduced Row-Echelon Matrices and Solution Sets
 - (e) Matrix Arithmetic
 - (f) The Multiplicative Identity and Inverse Matrices
 - (g) Determinants
 - (h) Functions of Matrices
 - (i) Eigenvalues and Eigenvectors
 - (j) Complex Eigenvalues and Eigenvectors

| Date | Topic | Reference |
|--------|---|--|
| Jan 09 | Conic Sections | Stewart, Section 10.5 |
| Jan 11 | Parametric Equations | Stewart, Section 10.1 |
| Jan 16 | NO CLASS | MLK Day |
| Jan 18 | Polar Coordinates | Stewart, Section 10.3 |
| Jan 23 | Complex Numbers | Stewart, Appendix G |
| Jan 25 | 3D Coordinates and Vectors | Stewart, Sections 12.1, 12.2 |
| Jan 30 | Dot and Cross Product | Stewart, Sections 12.3, 12.4 |
| Feb 01 | Equation of Lines and Planes | Stewart, Section 12.5 |
| Feb 06 | Curves in 3 Dimensions | Stewart, Section 13.1 |
| Feb 08 | Cylinders and Quadric Surfaces | Stewart, Section 12.6 |
| Feb 13 | TEST 1 | Stewart, 10.1, 10.3, 10.5, App.G, 12.1-5 |
| Feb 15 | Solids and Surfaces of Revolutions | Stewart, Sections 5.2, 8.2 |
| Feb 20 | Graphs of Functions of 2 Variables | Stewart, Section 14.1 |
| Feb 22 | Cylindrical Coordinates | Stewart, Section 15.8 |
| Feb 27 | Spherical Coordinates | Stewart, Section 15.9 |
| Mar 01 | Parametric Equations of Surfaces | Stewart, Section 16.6 |
| Mar 06 | Systems of Linear Equations | Kitchens, Sections 1, 2 |
| Mar 08 | Matrices and Row Operations | Kitchens, Section 3 |
| Mar 13 | NO CLASS | Spring Break |
| Mar 15 | NO CLASS | Spring Break |
| Mar 20 | TEST 2 | Stewart, 12.6, 13.1, 14.1, 15.8-9, 16.6 |
| Mar 22 | Gaussian Elimination | Kitchens, Section 4 |
| Mar 27 | Reduced Row Echelon Matrices | Kitchens, Section 5 |
| Mar 29 | Matrix Arithmetic | Kitchens, Section 6 |
| Apr 03 | Identity Matrix and Inverse of Matrices | Kitchens, Section 7 |
| Apr 05 | Determinants | Kitchens, Section 8 |
| Apr 10 | Functions of Matrices | Kitchens, Section 9 |
| Apr 12 | Eigenvalues and Eigenvectors | Kitchens, Section 10-11 |
| Apr 17 | Review of Linear Algebra | Kitchens, Sections 1-11 |
| Apr 19 | TEST 3 | Kitchens, Sections 1-11 |
| Apr 24 | Course Review | Practice Finals |
| Apr 26 | Course Review | Practice Finals |
| Apr 30 | Common Department Final Exam | 1:00PM - 3:00PM |

Mathematics Assistance Center

MAC and MAC STAT are services of the Department of Mathematical Sciences and University College at IUPUI. **The Mathematics Assistance Center (MAC) and MAC Stat will be located in Taylor Hall (UC B001)** The MAC offers peer tutoring to students in the Algebra, Elementary Education Math, Algebra and Trigonometry, Finite Math, and Calculus classes listed below. The MAC STAT offers peer tutoring to students in the Statistics and Non-Math Department courses listed below.



We are here to help!

Check us out!

Algebra

11000, 11100

Elementary Education Math

13000, 13100, 13200, 13600

Algebra & Trigonometry

15300, 15400, 15900

Finite Mathematics

M-118

Calculus

16500, 16600, 17100, 22100,
22200,
23100, 23200, 26100, 26600,
M-119

Statistics

30100, 35000

Non-Math Department Courses

SPEA K-300, BUS K-201

We are closed: Labor Day Weekend, Fall Break and Weekend after Fall Break, Thanksgiving Break, Winter Break, MLKJ Day Weekend, Spring Break, Easter Sunday, Spring Semester Break, Memorial Day, June Nineteenth, Independence Day, and both Summer Semester Breaks.

Scan the QR code to visit our website for our updated hours!



mac.iupui.edu