



Nanchang University MATH 21: Intermediate Calculus

Credit: 4

Contact Hours

This course is composed of 24 lecture sessions, 3 tutorial sessions and 9 office contact hours. Each lecture session takes 2 contact hours in length; each tutorial session takes 3 contact hours in length; There will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours) at the end of this term. This course has 72 contact hours in total.

Course Description

This course is an important foundation course for higher learning of mathematics. Students review and extend their knowledge of trigonometry and basic analytic geometry. Important objectives of the calculus sequence are to develop and strengthen the students' problem-solving skills and to teach them to read, write, speak, and think in the language of mathematics. In particular, students learn how to apply the tools of calculus to a variety of problem situations.

Required Textbook

Intermediate Calculus by Murray H. Protter, Charles B. Morrey Jr., 2nd Edition

Publisher: Springer-Verlag; ISBN: 978-1-4612-7006-5

Grading

- Participation 10%
- Homework and assignments 20%
- Quizzes 20%
- Midterm Exam 20%
- Final Exam 30%

A+ 96-100	A 90-95	A- 85-89
B+ 82-84	B 78-81	B- 75-77
C+ 71-74	C 66-70	C- 62-65
D 60-61	F < 60	



Course Schedule

The course has 24 class sessions in total. All sessions are 2 contact hours in length. At the end of this term, there will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours).

Note: the course outline and required readings are subject to change.

Class 1:

Introduction to and academic expectations for the course
The Number Space R^3 . Coordinates. The Distance Formula
Direction Cosines and Numbers; Equations of a Line; The Plane
Reading: Chapter 1 Analytic Geometry in Three Dimensions

Class 2:

Angles, Distance from a Point to a Plane
The Sphere; Cylinders; Other Coordinate Systems
Reading: Chapter 1 Analytic Geometry in Three Dimensions

Class 3:

Vectors
Directed Line Segments and Vectors in the Plane; Operations with Vectors
Operations with Plane Vectors, Continued; The Scalar Product
Vectors in Three Dimensions; Linear Dependence and Independence
Reading: Chapter 2

Class 4:

The Scalar (Inner or Dot) Product
The Vector or Cross Product; Products of Three Vectors
Reading: Chapter 2
Quiz 1

Class 5:

Vector Functions and Their Derivatives; Vector Velocity and Acceleration in the Plane
Vector Functions in Space. Space Curves. Tangents and Arc Length
Reading: Chapter 2

Class 6:

Infinite Series
Indeterminate Forms; Convergent and Divergent Series
Series of Positive Terms; Series of Positive and Negative Terms
Reading: Chapter 3

Class 7:

Power Series



Taylor's Series; Taylor's Theorem with Remainder

Reading: Chapter 3

Class 8:

Differentiation and Integration of Series

Validity of Taylor Expansions and Computations with Series; Algebraic Operations with Series

Uniform Convergence; Sequences of Functions; Uniform Convergence of Series

Reading: Chapter 3

Quiz 2

Class 9:

Integration and Differentiation of Power Series; Double Sequences and Series

Complex Functions. Complex Series

Reading: Chapter 3

Class 10:

Partial Derivatives. Applications

Limits and Continuity; Partial Derivatives; Implicit Differentiation

Reading: Chapter 4

Class 11:

The Chain Rule; Applications of the Chain Rule

Directional Derivatives; Gradient

Geometric Interpretation of Partial Derivatives; Tangent Planes

Reading: Chapter 4

Class 12:

The Total Differential; Approximation; Applications of the Total Differential

Second and Higher Derivatives

Taylor's Theorem with Remainder

Reading: Chapter 4

Quiz 3

Class 13:

Maxima and Minima; Maxima and Minima by the Methods of Lagrange Multipliers

Exact Differentials

Definition of a Line Integral; Calculation of Line Integral; Path-Independent line Integrals

Reading: Chapter 4

Class 14:

Review; Midterm

Class 15:

Multiple Integration



Definition of the Double Integral; Properties of the Double Integral
Evaluation of Double Integrals. Iterated Integrals; Area, Density, and Mass
Evaluation of Double Integrals by Polar Coordinates
Reading: Chapter 5

Class 16:

Moment of Inertia and Center of Mass; Surface Area
The Triple Integral; Mass of Region in R^2
Triple Integrals in Cylindrical and Spherical Coordinates; Moment of Inertia. Center of Mass
Reading: Chapter 5
Quiz 4

Class 17:

Fourier Series; Half-Range Expansions
Expansions on Other Intervals; Convergence Theorem
Differentiation and Integration of Fourier; The Complex Form Fourier Series
Reading: Chapter 6

Class 18:

Implicit Function Theorem; Jacobians; Implicit Function Theorems
Implicit Function Theorems for Systems; Transformations and Jacobians
Reading: Chapter 7

Class 19:

Differentiation under the Integral Sign; Improper Integrals; The Gamma Function
Differentiation under the Integral Sign; Tests for Convergence of Improper Integrals
The Gamma Function; Improper Multiple Integrals; Functions Defined by Improper Integrals
Reading: Chapter 8

Class 20:

Vector Field Theory; Vector Functions
Vector and Scalar Fields, Directional Derivative and Gradient
The Divergence of A Vector Field; The Curl of a Vector Formation
Line Integrals; Vector Formulation; Path-Independent Line Integrals
Reading: Chapter 9
Quiz 5

Class 21:

Green's Theorems; Proof of Green's Theorem
Change of Variables in a Multiple Integral; Surface Elements
Surfaces. Parametric Representation; Area of a Surface; Surface Integrals; Orientable Surfaces
Reading: Chapter 10

Class 22:



Stokes' Theorem; The Divergence Theorem

Reading: Chapter 10

Class 23:

Stokes' Theorem; The Divergence Theorem(Cont)

Class 24:

Matrices and Determinants (Appendix 1)

Overall review

Attending Policy

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.

Policy on "Late Withdrawals"

In accordance with university policy, appeals for late withdrawal will be approved **ONLY** in case of medical emergency and similar crises.

Academic Honesty

Nanchang University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

General Expectations:

Students are expected to:

- Attend all classes and be responsible for all materials covered in class and otherwise assigned;
- Complete the day's required reading and assignments before class;
- Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;
- Participate in class discussions and complete required written work on time;
- Refrain from texting, phoning or engaging in computer activities unrelated to class during the class period;
- While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Special Needs or Assistance



Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.