



## Nanchang University MATH 12: Introduction to Functions

**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 introductory investigation of functions, exploring the graphical behavior of, interpretation of, and solutions to problems involving linear, polynomial, rational, exponential, and logarithmic functions. Trigonometry, polynomials, variables, polynomial algebra, graphs of functions, equations, inequalities and the other conceptual and basic knowledge of mathematics are also included.

### ***Required Textbook***

*Precalculus: An Investigation of Functions* by David Lippman

Edition: Edition 1.5

Publisher: Creative Common

### ***Supplementary Reading***

*Numerical Polynomial Algebra* by Hans J. Stetter

Publisher: Society For Industrial & Applied Mathematics, U. S.

Publication Date: January 5, 2004

ISBN-10: 0898715571

ISBN-13: 9780898715576

### ***Grading***

- |                           |     |
|---------------------------|-----|
| ● Participation           | 10% |
| ● Homework and Assignment | 20% |
| ● Quizzes                 | 20% |
| ● Mid-terms               | 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 the course and explanation of the syllabus

Class 2:

Chapter 1: Functions

Section 1.1 Functions and Function Notation

Section 1.2 Domain and Range

Class 3:

Chapter 1: Functions

Section 1.3 Rates of Change and Behavior of Graphs

Section 1.4 Composition of Functions

Quiz 1

Class 4:

Chapter 1: Functions

Section 1.5 Transformation of Functions

Section 1.6 Inverse Functions

Class 5:

Chapter 2: Linear Functions

Section 2.1 Linear Functions

Section 2.2 Graphs of Linear Functions

Class 6:

Chapter 2: Linear Functions

Section 2.3 Modeling with Linear Functions

Section 2.4 Fitting Linear Models to Data

Section 2.5 Absolute Value Functions

Quiz 2



Class 7:

Chapter 3: Polynomial and Rational Functions

Section 3.1 Power Functions & Polynomial Functions

Section 3.2 Quadratic Functions

Class 8:

Chapter 3: Polynomial and Rational Functions

Section 3.3 Graphs of Polynomial Functions

Section 3.4 Rational Functions

Section 3.5 Inverses and Radical Functions

Class 9:

Review of Chapter 1 to Chapter 3

Reading: Part I - Polynomials and Numerical Analysis: 1. Polynomials; 2. Representations of polynomial ideals; 3. Polynomials with coefficients of limited accuracy; 4. Approximate numerical computation

Mid-term 1

Class 10:

Chapter 4: Exponential and Logarithmic Functions

Section 4.1 Exponential Functions

Section 4.2 Graphs of Exponential Functions

Class 11:

Chapter 4: Exponential and Logarithmic Functions

Section 4.3 Logarithmic Functions

Section 4.4 Logarithmic Properties

Quiz 3

Class 12:

Chapter 4: Exponential and Logarithmic Functions

Section 4.5 Graphs of Logarithmic Functions

Section 4.6 Exponential and Logarithmic Models

Section 4.7 Fitting Exponentials to Data

Class 13:

Chapter 5: Trigonometric Functions of Angles

Section 5.1 Circles

Section 5.2 Angles

Class 14:

Chapter 5: Trigonometric Functions of Angles

Section 5.3 Points on Circles using Sine and Cosine



Section 5.4 The Other Trigonometric Functions; Section 5.5 Right Triangle Trigonometry

Class 15:

Review of Chapter 4 to Chapter 5

Reading: Part II - Univariate Polynomial Problems: 5. Univariate polynomials; 6. Various tasks with empirical univariate polynomials; Part III - Multivariate Polynomial Problems: 7. One multivariate polynomial; 8. Zero-dimensional systems of multivariate polynomials

Mid-term 2

Class 16:

Chapter 6: Periodic Functions

Section 6.1 Sinusoidal Graphs

Section 6.2 Graphs of the Other Trig Functions

Class 17:

Chapter 6: Periodic Functions

Section 6.3 Inverse Trig Functions

Section 6.4 Solving Trig Equation

Section 6.5 Modeling with Trigonometric Equation

Quiz 4

Class 18:

Chapter 7: Trigonometric Equations and Identities

Section 7.1 Solving Trigonometric Equation with Identities

Section 7.2 Addition and Subtraction Identities

Class 19:

Chapter 7: Trigonometric Equation and Identities

Section 7.3 Double Angle Identities

Section 7.1 Modeling Changing Amplitude and Midline

Class 20:

Review of Chapter 6 to Chapter 7

Reading: Part III - Multivariate Polynomial Problems: 9. Systems of empirical multivariate polynomials; 10. Numerical basis computation; Part IV. Positive-Dimensional Polynomial Systems: 11. Matrix eigenproblems for positive-dimensional system

Class 21:

Chapter 8: Further Applications of Trigonometry

Section 8.1 Non-right Triangles: Law of Sines and Cosines

Section 8.2 Polar Coordinates

Quiz 5

Class 22:

Chapter 8: Further Applications of Trigonometry



## Section 8.3 Polar Form of Complex Numbers

Class 23:

Section 8.4 Vectors

Class 24:

Section 8.5 Parametric Equations

### ***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.