

TAIWAN-PARAGUAY POLYTECHNIC UNIVERSITY

COURSE TITLE: PRECALCULUS

OBJECTIVE: This course includes algebra and trigonometry at a level which is designed to prepare students for the study of calculus.

TIME: 20th-Aug-2018 to 12th-Jan-2019

LECTURERS: Fang-Jung Shiou, Fuchen Teng, Liang-Kuang Chen.

Office Hour: TBD

TEXT BOOKS: Precalculus: Mathematics for Calculus, 7/e, edited by James Stewart, Lothar Redlin, and Saleem Watson, CENGAGE Learning, 2015.

ISBN: 978-1-305-99998-5

REFERENCE: Precalculus with Limits, Ron Larson

NOTE:

- (1) Homework problem sets will be assigned and will typically be due one week later. Homework should be submitted to TA.
- (2) Late submission of the assignment is not allowed

GRADE:

Attendance	10%
Homework	30%
Mid-term Exam	30%
Final Exam	30%

	100%

COURSE CONTENTS

1. Fundamentals
 - 1.7 Modeling with Equations (exercises: 25, 49, 53, 85)
 - 1.8 Inequalities (exercises: 33, 55, 83, 109)
 - 1.9 The Coordinate Plane, Graphs of Equations, Circles (exercises: 35, 99, 107, 111)
 - 1.10 Lines (exercises: 9, 47, 84, 87)
 - 1.11 Solving Equations and Inequalities Graphically (exercises: 37, 47, 81)
 - 1.12 Modeling Variation (exercises: 23, 35, 37, 40, 47)
2. Functions
 - 2.1 Functions (exercises: 21, 33, 71, 88)
 - 2.2 Graphs of Equations (exercises: 15, 61, 69, 83)
 - 2.3 Getting Information from the Graph of Functions (exercises: 27, 35, 47, 65)
 - 2.4 Average Rate of Changes of a Function (exercises: 15, 19, 25, 31)
 - 2.5 Linear Functions and Models (exercises: 39, 43, 45, 48)
 - 2.6 Transformations of Functions (exercises: 33, 43, 71, 87)
 - 2.7 Combining Functions (exercises: 59, 77)
 - 2.8 One-to-One Functions and Their Inverses (exercises: 61, 93)
3. Polynomial and Rational Functions
 - 3.1 Quadratic Functions and Models (exercises: 55, 65)
 - 3.2 Polynomial Functions and Their Graphs (exercises: 11, 67)
 - 3.3 Dividing Polynomials (exercises: 31, 57)
 - 3.4 Real Zeros of Polynomials (exercises: 45, 81)
 - 3.5 Complex Zeros and the Fundamental Theorem of Algebra (exercises: 41, 47)
 - 3.6 Rational Functions (exercises: 45, 63)
 - 3.7 Polynomials and Rational Inequalities (exercises: 23, 55)
4. Exponential and Logarithmic Functions
 - 4.1 Exponential Functions (exercises: 57, 63)
 - 4.2 The Natural Exponential Functions (exercises: 27, 33)
 - 4.3 Logarithmic Functions (exercises: 49, 97)
 - 4.4 Laws of Logarithms (exercises: 37, 73)
 - 4.5 Exponentials in Logarithmic Equations (exercises: 63, 99)
 - 4.6 Modeling with Exponential Functions (exercises: 9, 25)
 - 4.7 Logarithmic Scales (exercises: 3, 9)
5. Trigonometric Functions: Unit Circle Approach
 - 5.1 The Unit Circle (exercises: 27, 47)
 - 5.2 Trigonometric Functions of Real Numbers (exercises: 53, 63)
 - 5.3 Trigonometric Graphs (exercises: 37, 69)
 - 5.4 More Trigonometric Graphs (exercises: 43, 49)
 - 5.5 Inverse Trigonometric Functions and Their Graphs (exercises: 9, 37)
 - 5.6 Modeling Harmonic Motions (exercises: 29, 35)
6. Trigonometric Functions: Right Triangle Approach
 - 6.1 Angle Measure (exercises: 63, 87)
 - 6.2 Trigonometry of Right Triangles (exercises: 23, 61)
 - 6.3 Trigonometric Functions of Angles (exercises: 41, 49)
 - 6.4 Inverse Trigonometric Functions and Right Triangles (exercises: 29, 37)
 - 6.5 The Law of Sines (exercises: 21, 42)
 - 6.6 The Law of Cosines (exercises: 37, 45)

7. Analytic Trigonometry
 - 7.1 Trigonometric Identities (exercises: 23, 65)
 - 7.2 Addition and Subtraction Formulas (exercises: 47, 65)
 - 7.3 Double Angles, Half Angles, and Product-Sum Formulas (exercises: 101, 114)
 - 7.4 Basic Trigonometric Functions (exercises: 53, 57)
 - 7.5 More Trigonometric Functions (exercises: 64, 68)
8. Polar Coordinates and Parametric Equations
 - 8.1 Polar Coordinates (exercises: 47, 59)
 - 8.2 Graphs of Polar Equations (exercises: 13, 61)
 - 8.3 Polar Form of Complex Numbers; De Moivre's Theorem (exercises: 65, 93)
 - 8.4 Plane Curves and Parametric Equations (exercises: 31, 57)
9. Vectors in Two and Three Dimensions
 - 9.1 Vectors in Two Dimensions (exercises: 63+64, 73)
 - 9.2 The Dot Product (exercises: 44, 47)
 - 9.3 Three Dimensional Coordinate Geometry (exercises: 19, 22)
 - 9.4 Vectors in Three Dimensions (exercises: 37, 41)
 - 9.5 The Cross Products (exercises: 17, 35)
 - 9.6 Equations of Lines and Planes (exercises: 27, 33)
10. Systems of Equations and Inequalities
 - 10.1 Systems of Linear Equations in Two Variables (exercises: 39, 65)
 - 10.2 Systems of Linear Equations in Several Variables (exercises: 33, 39)
 - 10.3 Matrices and Systems of Linear Equations (exercises: 52, 71)
 - 10.4 The Algebra of Matrices (exercises: 51, 57)
 - 10.5 Inverse of Matrices and Matrix Equations (exercises: 54, 61)
 - 10.6 Determinants and Cramer's Rule (exercises: 65, 72)
 - 10.7 Partial Fractions (exercises: 41, 45)
 - *10.8 Systems of Nonlinear Equations
 - *10.9 Systems of Inequalities
11. Conic Sections
 - 11.1 Parabolas (exercises: 57, 61)
 - 11.2 Ellipse (exercises: 57, 65)
 - 11.3 Hyperbolas (exercises: 41, 56)
 - 11.4 Shifted Conics (exercises: 35, 63)
 - *11.5 Rotations of Axes (exercises: 23, 33)
 - *11.6 Polar Equations of Conics
12. Sequences and Series
 - 12.1 Sequences and Summation Notation (exercises: 69, 80)
 - 12.2 Arithmetic Sequences (exercises: 47, 75)
 - 12.3 Geometric Sequences (exercises: 84, 93)
 - *12.4 Mathematics of Finance
 - 12.5 Mathematical Induction
 - 12.6 The Binomial Theorem
 - 12.7 Combination and Permutation
13. Limits: A Preview of Calculus
 - 13.1 Finding Limits Numerically and Graphically
 - 13.2 Finding Limits Algebraically
 - 13.3 Tangent Lines and Derivatives
 - 13.4 Limits at Infinity; Limits of Sequences
 - 13.5 Areas