

**NEW YORK CITY COLLEGE OF TECHNOLOGY**  
**The City University of New York**

**DEPARTMENT:** Mathematics

**COURSE:** MAT 1375

**TITLE:** Precalculus

**DESCRIPTION:** Topics include an in-depth study of functions such as polynomial functions, radical functions, rational functions, trigonometric functions, exponential and logarithmic functions; connections to vectors and complex numbers; solving trigonometric equations, and identities involving sum, double and half-angle formulas; Binomial Theorem and progressions.

**TEXTS:** Precalculus  
Second Edition  
By Thomas Tradler and Holly Carley  
Available on [www.lulu.com](http://www.lulu.com)  
PDF available from:  
[websupport1.citytech.cuny.edu/faculty/ttradler/precalculus.html](http://websupport1.citytech.cuny.edu/faculty/ttradler/precalculus.html)

**CREDITS:** 4

**PREREQUISITES:** MAT 1275

Prepared by Professor Thomas Tradler  
(Spring 2013)

- A. Testing Guidelines:  
The following exams should be scheduled:
1. A one-hour exam at the end of the First Quarter
  2. A one-session exam at the end of the Second Quarter
  3. A one-hour exam at the end of the Third Quarter
  4. A one-session Final Examination
- B. Graphing calculators are required.

## Course Intended Learning Outcomes/Assessment Methods

Learning Outcomes	Assessment Methods
<b>1.</b> <ul style="list-style-type: none"> <li>• Solve absolute value equations algebraically.</li> <li>• Solve equations graphically.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>2.</b> <ul style="list-style-type: none"> <li>• Determine the domain, and range of a given function.</li> <li>• Find the sum, difference, product, quotient, and composition of functions.</li> <li>• Determine the effects of basic operations on graphs of functions.</li> <li>• Determine the inverse of a function, if it exists.</li> <li>• Determine the roots and relative extrema of polynomials.</li> <li>• Sketch the graphs of polynomial, rational, exponential, and logarithmic functions.</li> <li>• Solve equations involving polynomial, rational, exponential, and logarithmic functions.</li> <li>• Solve polynomial, rational and absolute value inequalities.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>3.</b> <ul style="list-style-type: none"> <li>• Find the amplitude, phase shift, and period of trigonometric functions.</li> <li>• Use the trigonometric identities, half- and double-angle formulas to modify trigonometric formulas.</li> <li>• Solve trigonometric equations</li> </ul>	Classroom activities and discussion, homework, exams.
<b>4.</b> <ul style="list-style-type: none"> <li>• Write a complex number in rectangular and polar forms.</li> <li>• Multiply and divide two complex numbers in polar form.</li> <li>• Find the magnitude, direction angle, horizontal, and vertical components of a vector.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>5. Find</b> <ul style="list-style-type: none"> <li>• The n-th term of arithmetic and geometric sequences.</li> <li>• The n-th partial sums of arithmetic and geometric sequences.</li> <li>• Terms of a binomial expansion using the Binomial Theorem.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>6. Use a graphing calculator to assist in the above.</b>	Classroom activities and discussion, homework, exams.

## **General Education Learning Outcomes/Assessment Methods**

<b>Learning Outcomes</b>	<b>Assessment Methods</b>
<b>1.</b> Understand and employ both quantitative and qualitative analysis to solve problems.	Classroom activities and discussion, homework, exams.
<b>2.</b> Employ scientific reasoning and logical thinking.	Classroom activities and discussion, homework, exams.
<b>3.</b> Communicate effectively using written and oral means.	Classroom activities and discussion, homework, exams.
<b>4.</b> Use creativity to solve problems.	Classroom activities and discussion, homework, exams.

### **New York City College of Technology Policy on Academic Integrity**

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.

## MAT 1375 - Precalculus

**Textbook:** “Precalculus” by Thomas Tradler and Holly Carley, Second Edition, available on [www.lulu.com](http://www.lulu.com)

**PDF available from:** <http://websupport1.citytech.cuny.edu/faculty/ttradler/precalculus.html>

**WeBWorK:** WeBWorK for MAT 1375 uses the OpenLab Q&A site: <https://openlab.citytech.cuny.edu/ol-webwork/>

Students will need an [OpenLab](#) account in order to post new questions.

Session	Topic	Homework	WeBWorK Set
1	1. The Absolute Value	1.1, 1.2, 1.3 (a)-(e), 1.4 (a)-(f), 1.6, 1.7 (a)-(f)	Absolute Value Inequalities Interval Notation
2	2. Lines and Functions	2.1 (a)-(c), 2.3 (a)-(c), 2.5-2.8 all	Lines Review
3	3. Functions by Formulas and Graphs	3.1 (a)-(b), 3.2, 3.4 (a)-(f), 3.6 (a)-(f), 3.7 (a)-(g) and (m)-(t), 3.8, 3.9	Functions - Function Notation Functions - Difference Quotient Functions - Piecewise
4	4. Introduction to the TI-84	4.1, 4.2 (a), 4.3 (c)-(i), 4.6	
5	5. Basic Functions and Transformations	5.1, 5.2 (a)-(f), 5.3 (a)-(d), 5.5 (a)-(e)	Functions - Translations Functions - Symmetries
6	6. Operations on Functions	6.1 (a)-(c), 6.2 (a)-(b), 6.3 (a)-(d), 6.4 (a)-(c), 6.5 (a)-(b), 6.6, 6.7	Functions - Operations
7	7. The Inverse of a Function	7.1 (a)-(c), 7.2 (a)-(f) and (l)-(p), 7.3 (a)-(c), 7.4 (a)-(c), 7.5 (a) and (d)	Functions - Inverse Functions
8	<b>First Examination</b>		
9	8. Dividing Polynomials (8.3 Synthetic Division is <i>optional</i> )	8.1 (a)-(c) and (j)-(k), 8.2, 8.3, 8.4 (a)-(d) ( <i>optional</i> : 8.5 (a)-(d))	Polynomials - Division
10	9. Graphing Polynomials (9.3 Graphing Polynomials by Hand is <i>optional</i> )	9.1-9.3 all, 9.4 (a)-(c), 9.5 (a)-(c) ( <i>optional</i> : 9.6)	Polynomials - Graphs
11	10. Roots of Polynomials (10.1 Rational Root Theorem is <i>optional</i> )	10.2 (a)-(d), 10.3 (a)-(c), 10.4 (a)-(c) and (f)-(h), 10.5 (a)-(c) and (f)-(i) ( <i>optional</i> : 10.1)	Polynomials - Rational Roots Polynomials - Theory
12	11. Rational Functions (11.2 Graphing Rational Functions by Hand is <i>optional</i> )	11.1-11.4 all	Rational Functions - Domains Rational Functions - Asymptotes Rational Functions - Intercepts Rational Functions - Comprehensive
13	12. Polynomial and Rational Inequalities	12.1 (a)-(c), 12.2 (g)-(j), 12.4 (a)-(f), 12.5	Polynomials - Inequalities Rational Functions - Inequalities
14	13. Exponential and Logarithmic Functions	13.1 (a)-(f), 13.2 (a)-(e), 13.4, 13.5 (a)-(b), 13.6 (a)-(h)	Exponential Functions - Graphs Logarithmic Functions - Graphs
15	<b>Midterm Examination</b>		

Session	Topic	Homework	WeBWorK Set
16	14. Properties of Exp and Log	14.1 (a)-(e), 14.2 (a)-(f), 14.3 (a)-(c) and (e), 14.4 (e)-(g), 14.5 (a)-(e)	Logarithmic Functions - Properties Exponential Functions - Equations Logarithmic Functions - Equations
17	15. Applications of Exp and Log	15.1 (a)-(b), 15.3-15.8 all	Exponential Functions - Growth and Decay
18	16. Half-life and Compound Interest	16.1-16.7 all, 16.9 (a)-(c), 16.10 (a)-(e)	Exponential Functions - Growth and Decay
19	17. Trigonometric Functions	17.1 (a)-(d) and (g)-(h), 17.3, 17.4, 17.5 (a)-(d), 17.6 (a)-(g)	Trigonometry - Unit Circle Trigonometry - Graphing Amplitude Trigonometry - Graphing Period Trigonometry - Graphing Phase Shift Trigonometry - Graphing Comprehensive
20	18. Addition of Angles and Multiple Angle Formulas	18.1 (a)-(e), 18.2 (a)-(b), 18.3 (a)-(d), 18.4 (a)-(d)	Trigonometry - Sum and Difference Formulas Trigonometry - Double and Half Angle Formulas
21	19. Inverse Trigonometric Functions	19.1, 19.2 (a)-(j), 19.3 (a)-(c) and (g)-(i)	Trigonometry - Inverse Functions
22	20. Trigonometric Equations	20.1 (a)-(d), 20.2 (a)-(b), 20.4 (a)-(k), 20.5 (a)	Trigonometry - Equations
23	<b>Third Examination</b>		
24	21. Complex Numbers	21.1 (a)-(c), 21.2 (b)-(e), 21.3 (a)-(c), 21.4 (a)-(d), 21.5 (c)-(d), 21.6 (a)-(d), 21.7 (a)-(d)	Complex Numbers - Operations Complex Numbers - Magnitude Complex Numbers - Direction Complex Numbers - Polar Form
25	22. Vectors in the Plane	22.1 (a) and (d), 22.2 (a)-(d), 22.3 (b)-(f) and (k)-(m), 22.4 (a)-(b)	Vectors - Operations Vectors - Components Vectors - Magnitude and Direction Vectors - Unit Vectors
26	23. Sequences and Series	23.1 (a)-(c), 23.3 (a)-(d), 23.4 (a)-(d), 23.5 (a)-(b), 23.7 (a)-(b) and (e)-(i)	Sequences - Intro Series - Intro Sequences - Arithmetic Series - Finite Arithmetic
27	24. The Geometric Series	24.1 (a)-(d), 24.2 (a)-(c), 24.3 (a)-(b) and (e)-(i), 24.4 (c) and (f)-(i), 24.5 (a)	Sequences - Geometric Series - Geometric
28	25. The Binomial Theorem	25.1 (a) and (i)-(l), 25.2 (b), 25.3 (a)-(d), 25.4 (a)-(d), 25.5 (a)-(d), 25.6 (a)-(d)	Sequences - Binomial Theorem
29	<b>Review</b>	<b>Final Exam Review Problems</b>	
30	<b>Final Exam</b>		