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

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| **DEPARTMENT:** | Mathematics |
| **COURSE:** | MAT 1375/ MA 375 |
| **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. |
| **TEXT:** | Contemporary Precalculus: A Graphing Approach<br>5th edition<br>Thomas W. Hungerford & Douglas J. Shaw<br>Brooks/Cole-Thomson Learning |
| **CREDITS:** | 4 |
| **PREREQUISITES:** | MAT 1275/MA 275 |

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Prepared by:
Curriculum Committee:
Prof. M. Ajoodanian
Prof. N. Benakli
Prof. H. Carley
Prof. Y. F. Celikler
Prof. S. Singh
Prof. A. P. Taraporevala (chair)
Spring 2010

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.

**Learning Outcomes**
**For**
**MAT 1375/ MA 375 Precalculus**

1. Students will be able to
   - Solve absolute value equations algebraically.
   - Solve equations graphically.

2. Students will be able to
   - Determine the domain, and range of a given function.
   - Find the sum, difference, product, quotient, and composition of functions.
   - Determine the effects of basic operations on functions on graphs.
   - Determine when an inverse of a function, if it exists.
   - Determine the roots and relative extrema of polynomials.
   - Sketch the graphs of polynomial, rational, exponential and logarithmic functions.
   - Solve problems involving polynomial, rational, exponential, and logarithmic functions.
   - Solve polynomial, rational and absolute value inequalities.

3. Students will be able to
   - Find the amplitude, phase shift, and period of trigonometric functions.
   - Use the trigonometric identities, half- and double-angle formulas to modify trigonometric formulas.
   - Solve trigonometric equations.

4. Students will be able to
   - Write a complex number in the rectangular and polar forms.
   - Multiply and divide two complex numbers in polar form.
   - Find the magnitude, direction angle, horizontal, and vertical components of a vector.

5. Students will be able to find
   - The n-th term of arithmetic and geometric sequences.
   - The n-th partial sums of arithmetic and geometric sequences.
   - Terms of a binomial expansion using the Binomial Theorem.

6. Students will be able to use a graphing calculator to assist in the above.

## Mathematics Department Policy on Lateness/Absence

A student may be absent during the semester without penalty for 10% of the class instructional sessions. Therefore,

| If the class meets: | The allowable absence is: |
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| 1 time per week | 2 absences per semester |
| 2 times per week | 3 absences per semester |

Students who have been **excessively absent and failed the course at the end of the semester will receive either**

- the WU grade if they have attended the course at least once. This includes students who stop attending without officially withdrawing from the course.
- the WN grade if they have never attended the course.

In credit bearing courses, the WU and WN grades count as an F in the computation of the GPA. While WU and WN grades in non-credit developmental courses do not count in the GPA, the WU grade does count toward the limit of 2 attempts for a developmental course.

**The official Mathematics Department policy is that two latenesses (this includes arriving late or leaving early) is equivalent to one absence**.

Every withdrawal (official or unofficial) can affect a student's financial aid status, because withdrawal from a course will change the number of credits or equated credits that are counted toward financial aid.

## 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 **Text:** Contemporary Precalculus: A Graphing Approach, by T. Hungerford & D. J. Shaw 5th edition

| Session | Precalculus | Homework |
|---|---|---|
| 1 | **1.1** The Real Number System (**pp.** 2 – 13)<br>**1.2A** *Special Topics:* Absolute Value Equations (**pp.** 32 – 33) | **P. 13**: 37 - 47 all, 123 - 134 all<br>**P. 33**: 1 - 4 all |
| 2 | **1.4** Lines (**pp.** 53 – 64)<br>**2.1** Graphs (**pp.** 78 – 87) | **P. 64**: 1, 13 - 16 all, 21, 22, 25, 37, 40<br>**P. 89**: 1 - 6 all, 9, 11, 15, 16, 19, 27 |
| 3 | **2.2** Solving Equations Graphically and Numerically (**pp.** 92 – 99)<br>**3.1** Functions (**pp.** 142 – 148) | **P. 100**: 7, 9, 21 - 27 odd<br>**P. 148**: 1, 3, 11-17 odd, 23-27 all, 32, 34, 42 - 44 all |
| 4 | **3.2** Functional Notation (**pp.** 151 – 158) | **P. 158**: 1 - 5 odd, 13, 17, 21, 27 - 31 all, 39, 41, 43, 49, 55 |
| 5 | **3.3** Graphs of Functions (**pp.** 168 – 169)<br>**3.4** Graphs and Transformations (**pp.** 179 – 186) | **P. 171**: 12-21 all, 47, 50<br>**P. 186**: 1 - 8 all, 10, 12, 15, 23, 24, 26,28 |
| 6 | **3.5** Operations on Functions (**pp.** 195 – 201) | **P. 202**: 3, 6, 11, 12-17 all, 19, 22, 25, 31-37 odd, 59 |
| 7 | **3.7** Inverse Functions (**pp.** 217 – 225) | **P. 226**: 1 -4 all, 9 – 21 odd, 23, 25, 33, 35, 41, 42 |
| 8 | **First Examination** | |
| 9 | **4.2** Polynomial Functions (**pp.** 250 – 257)<br>**4.2A** *Special Topics:* Synthetic Division (**pp.** 259 – 261) (Optional) | **P. 257**: 11, 12, 18, 19, 23, 27, 39,41, 51, 53, 55, 56, 61<br>**P. 262**: 3, 5, 9, 10, 13, 15 |
| 10 | **4.3** Real Roots of Polynomials (**pp.** 262 – 268) (Optional)<br>**4.4** Graphs of Polynomial Functions (**pp.** 270 – 278) | **P. 268**: 1, 3, 5, 17-19 all, 23, 25, 29, 31, 34<br>**P. 278**: 1 - 12 all, 19 – 24 all, 25, 29, 31, 43, 45 |
| 11 | **4.8** Theory of Equations ( **pp.** 328 - 332) | **P. 332**: 1, 3, 13, 17, 19, 21, 25, 26, 29, 30, 31, 45, 47 |
| 12 | **4.5** Rational Functions (**pp.** 288 – 300) | **P. 300**: 1, 2, 4, 7, 8, 15- 31 odd, 43, 45 |

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| 13 | **4.6** Polynomial and Rational Inequalities (**pp.** 308 – 315) | **P. 315**:3 – 11 odd, 25-30 all, 33-41 odd, 53, 54<br>**P. 158**: 50, 52, 54, 56, 57, 58 |
| 14 | **4.6A** *Special Topics:* Absolute Value Inequalities (**pp.** 317 – 320)<br>**5.2** Exponential functions and the number e (**pp**. 357-365) | **P. 320**: 1 - 6 all<br>**P.365:** 1-5 all 49,51,64,67,71,72,74 |
| 15 | **Midterm Examination** | |
| 16 | **5.2A** *Special Topics:* Compound Interest and the Number e (**pp.** 369 – 373) | **P. 374**: 3-9 odd, 11, 19, 23, 27, 28 |
| 17 | **5.3** Common and natural logarithmic functions(**pp.** 375-383)<br>**5.4** Properties of logarithms (**pp.** 385 – 390) | **P.383:** 5,9,11,15,19,23,43, 45,57,59,77,79<br>**P. 390**: 1 - 19 odd |
| 18 | **5.5** Algebraic solutions of exponential and logarithmic equations(**pp.** 399-406) | **P.406:** 1,7-11 odd 17,19, 51, 53, 55, 57, 59, 63, 67 |
| 19 | **6.2** Trigonometric functions (**pp.** 442-449)<br>**6.4** Basic Graphs (**pp.** 466 – 474)<br>**6.5** Periodic graphs (**pp.** 477-486) | **P.449:** 1-9 odd 15-29 odd**,** 30<br>**P.474:** 11-15 all, 23-30 all<br>**P. 486:** 2,5,6,27,28,31,32 |
| 20 | **7.2** Addition and Subtraction Identities (**pp.**523-526*)<br>**7.3** Other identities (**pp.** 535-539* ) | **P.530:** 1-9 odd 13,15<br>**P.542:** 1,3,5,11,13,15 |
| 21 | **7.4** Inverse trigonometric functions (**pp.** 545-553) | **P. 553:** 1-17 odd |
| 22 | **7.5** Trigonometric Equations (**pp.** 555 – 563) | **P. 564:** 7-33 odd, 34, 89, 93 |
| 23 | **Third Examination** | |
| 24 | **9.1** The Complex Plane and Polar Form of Complex Numbers (**pp.** 626 – 630) | **P. 630**: 1-5 odd, 9, 13, 25, 27, 37-45 odd, 53, 55, 59, 61 |
| 25 | **9.3** Vectors in the Plane (**pp.** 639 – 650) | **P. 651**: 5, 11, 15, 17, 21,27-49 odd |
| 26 | **12.1** Sequences and Sums (**pp.** 826 ) Give the definition of a sequence on page 826 then go to section 12.2<br>**12.2** Arithmetic Sequences (**pp.** 837 – 842) | **P. 835**: 1 – 11 odd, 41 – 45 all<br>**P. 842**: 1, 6, 7, 17 , 25, 33, 37, 41, 45, 61, 63 |

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| 27 | **12.3** Geometric Sequences (**pp.** 844 – 850)<br>**12.3A** *Special Topics:* Infinite Series (**pp.** 852 – 856) | **P. 850**: 1 - 7 odd, 13, 15, 23, 33, 39-47 odd<br>**P. 856**: 1 - 4 all, 7, 9, 10, 11, 13 |
| 28 | **12.4** The Binomial Theorem (**pp.** 857 – 862) | **P. 862**: 3, 4, 7, 23, 24, 27, 37, 49, 51 |
| 29 | **Final Examination Review** | |
| 30 | **Final Examination** | |

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