Course information:
Copy and paste current course information from Class Search/Course Catalog.

Academic Unit College of Liberal Arts and Sciences Department School of Mathematical and Statistical Sciences

Subject MAT Number 171 Title Precalculus: STEM Units: 4

Is this a cross-listed course? No
If yes, please identify course(s)

Is this a shared course? No If so, list all academic units offering this course

Course description:
Robust treatment of advanced algebraic skills and trigonometry that are vital in calculus. Algebra topics include functions, compositions, inverses, transformations, complex numbers, roots of polynomial functions, rational functions, exponential and logarithmic functions and their properties. Trigonometry is approached via the unit circle as well as the right triangle. Topics include the trigonometric functions, their graphs and identities, inverse trigonometry, the laws of sine and cosine, vectors and the dot product with an application toward work, and polar coordinates and roots of complex numbers (DeMoivre’s Theorem).

Requested designation: Mathematical Studies-MA
Note- a separate proposal is required for each designation requested

Eligibility:
Permanent numbered courses must have completed the university’s review and approval process.
For the rules governing approval of omnibus courses, contact the General Studies Program Office at (480) 965-0739.

Area(s) proposed course will serve:
A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study.

Checklists for general studies designations:
Complete and attach the appropriate checklist
- Literacy and Critical Inquiry core courses (L)
- Mathematics core courses (MA)
- Computer/statistics/quantitative applications core courses (CS)
- Humanities, Fine Arts and Design core courses (HU)
- Social and Behavioral Sciences core courses (SB)
- Natural Sciences core courses (SO/SG)
- Global Awareness courses (G)
- Historical Awareness courses (H)
- Cultural Diversity in the United States courses (C)

A complete proposal should include:
☑ Signed General Studies Program Course Proposal Cover Form
☑ Criteria Checklist for the area
☑ Course Syllabus
☑ Table of Contents from the textbook, and/or lists of course materials

Contact information:
Name Michelle Howe Phone 480-965-5385
Mail code 1804 E-mail michelle.howe@asu.edu

Department Chair/Director approval: (Required)
Arizona State University Criteria Checklist for

MATHEMATICAL STUDIES [MA]

Rationale and Objectives

The Mathematical Studies requirement is intended to ensure that students have skill in basic mathematics, can use mathematical analysis in their chosen fields, and can understand how computers can make mathematical analysis more powerful and efficient. The Mathematical Studies requirement is completed by satisfying both the Mathematics [MA] requirement and the Computer/Statistics/Quantitative Applications [CS] requirement explained below.

The Mathematics [MA] requirement, which ensures the acquisition of essential skill in basic mathematics, requires the student to complete a course in College Algebra, College Mathematics, or Precalculus, or demonstrate a higher level of skill by completing a mathematics course for which College Algebra is a prerequisite.

The Computer/Statistics/Quantitative Applications [CS] requirement, which ensures skill in real world problem solving and analysis, requires the student to complete a course that uses some combination of computers, statistics, and mathematics.

Revised MA March 2011
Proposer: Please complete the following section and attach appropriate documentation.

### ASU-[MA] CRITERIA

A MATHEMATICS [MA] COURSE MUST SATISFY ALL OF THE FOLLOWING CRITERIA:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Identify Documentation Submitted</th>
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<tbody>
<tr>
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<td>1. Mathematics course with a minimum prerequisite of Intermediate Algebra or a course already approved as satisfying the MA requirement.</td>
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<td>2. Applies mathematical skills in the solution of real life problems.</td>
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<td>3. Introduces or makes significant use of all of the following mathematical skills and concepts:</td>
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<td>a. Manipulation of mathematical expressions.</td>
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<td>b. Functions and their various forms of expression (algebraic, graphic, and numeric).</td>
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<td>c. Problem solving using mathematics.</td>
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<td>d. Quantitative literacy.</td>
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<td>4. Acceptable courses include (check applicable course):</td>
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<td>a. College Mathematics</td>
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<td>b. College Algebra</td>
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<td>c. Precalculus</td>
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<td>syllabus</td>
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<td>d. Any mathematics course with College Algebra as a prerequisite</td>
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<td>e. Any mathematics course with any of its prerequisite courses satisfying the MA criteria.</td>
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<tr>
<td>Course Prefix</td>
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<tr>
<td>MAT</td>
<td>171</td>
<td>Precalculus: STEM</td>
</tr>
</tbody>
</table>

Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

<table>
<thead>
<tr>
<th>Criteria (from checksheet)</th>
<th>How course meets spirit (contextualize specific examples in next column)</th>
<th>Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.a manipulation of mathematical expressions</td>
<td>course covers algebra and trigonometry topics as preparation for students to go on to various calculus courses</td>
<td>Course Description</td>
</tr>
<tr>
<td>3 b. functions and their expressions</td>
<td>Algebra topics include functions, compositions, inverses, transformations, complex numbers, roots of polynomial functions, rational functions, exponential and logarithmic functions and their properties.</td>
<td>Course Description</td>
</tr>
<tr>
<td>3 d. quantitative literacy</td>
<td>deeper understanding of algebra and trigonometry skills are necessary to succeed in calculus</td>
<td>Course Description and Student Learning Outcomes</td>
</tr>
</tbody>
</table>
MAT 171
Precalculus (STEM)

School of Mathematical and Statistical Sciences
College of Liberal Arts and Sciences

4 Credits

Prerequisite: Math 117 (College Algebra) with a C or better

Co-requisite: none

Course Description:
This course is a robust treatment of advanced algebraic skills and trigonometry that are vital in calculus. Algebra topics include functions, compositions, inverses, transformations, Complex numbers, roots of polynomial functions, rational functions, exponential and logarithmic functions and their properties. Trigonometry is approached via the unit circle as well as the right triangle. Topics include the trigonometric functions, their graphs and identities, inverse trigonometry, the laws of sine and cosine, vectors and the dot product with an application toward work, and polar coordinates and roots of complex numbers (deMoivre’s Theorem).

This course meets for three hours per week in lecture, and one hour of recitation.

Student Learning Outcomes:

- Students will have a deeper understanding of the necessary algebra and trigonometry skills necessary to succeed in calculus.

Assignments:
There will be weekly homework assignments (written and on-line) (25%), two exams (20%), and a final exam (30%). In-class quizzes, projects and other assessments account for the remaining 25%. Written exams will stress the conceptual aspects of the material and the ability to apply the concepts to real-world situations.

Required Materials:

- Blitzer, Robert. Precalculus Essentials (Pearson) (We can custom publish the text in agreement with Pearson)
- *MyMathLab* on-line access (Pearson)
<table>
<thead>
<tr>
<th>Weeks</th>
<th>Content</th>
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</table>
| 1     | Introduction  
       | Basics of Functions and Their Graphs |
| 2     | Functions & Graphs  
       | Transformations |
| 3     | Combinations of Functions: Composition  
       | Inverse Functions |
| 4     | Complex Numbers  
       | Quadratic Functions |
| 5     | Polynomial Functions and their Graphs  
       | Zeros of Polynomials (including Complex)  
       | Rational Functions |
| 6     | Exponential Functions  
       | Logarithms: Functions and Properties  
       | Equations and Applications  
       | **Exam 1** |
| 7     | Angles and Radian Measure  
       | The Unit Circle, Introduction to the Trigonometric Functions  
       | Right Triangle Trigonometry |
| 8     | Trigonometric Functions of Any Angle  
       | Graphs of Sine and Cosine Functions  
       | Graphs of Other Trigonometric Functions |
| 9     | Inverse Trigonometric Functions  
       | Trigonometric Identities |
| 10    | Sum and Difference Formulas  
       | Double-Angle and Half-Angle Identities |
| 11    | Trigonometric Equations  
       | Laws of Sines and Cosines  
       | **Exam 2** |
| 12    | Vectors  
       | The Dot Product |
| 13    | Projections of Vectors  
       | Application: Work |
| 14    | Polar Coordinates  
       | deMoivre's Theorem (Roots of Complex Numbers) |
| 15    | Review, Catch-up |
| 16    | Final Exam (Covers Exam 1, Exam 2 and newer material) |
Grading:
Grades will be assigned according to the following scale:
A+: 97-100%, A: 93-96.9%, A-: 90-92.9, B+: 87-89.9%, B: 83-86.9%, B-: 80-82.9%,
C+: 76-79.9%, C: 70-75.9%, D: 60-69.9% E: 59.9% or less.

Academic Dishonesty:
In the “Student Academic Integrity Policy” manual, ASU defines “Plagiarism” [as] using another’s
words, ideas, materials or work without properly acknowledging and documenting the source.
Students are responsible for knowing the rules governing the use of another’s work or materials and
for acknowledging and documenting the source appropriately.” You can find this definition at
http://provost.asu.edu/academicintegrity. Academic dishonesty, including inappropriate
collaboration, will not be tolerated. There are severe sanctions for cheating, plagiarizing and any
other form of dishonesty.

Establishing Eligibility for Disability Accommodations:
Students who feel they will need disability accommodations in this class but have not registered with
the Disability Resource Center (DRC) should contact DRC immediately. Their office is located on
the first floor of the Matthews Center Building. DRC staff can also be reached at: 480-965-1234
(V), 480-965-9000 (TTY). For additional information, visit: www.asu.edu/studentaffairs/ed/drc.
Their hours are 8:00 AM to 5:00 PM, Monday through Friday.
CONTENTS

P Prerequisites: Fundamental Concepts of Algebra 1
P.1 Algebraic Expressions, Mathematical Models, and Real Numbers 2
P.2 Exponents and Scientific Notation 19
P.3 Radicals and Rational Exponents 30
P.4 Polynomials 46
P.5 Factoring Polynomials 56
Mid-Chapter Check Point 67
P.6 Rational Expressions 68
P.7 Equations 82
P.8 Modeling with Equations 101
P.9 Linear Inequalities and Absolute Value Inequalities 114
SUMMARY, REVIEW, AND TEST 129
REVIEW EXERCISES 129
CHAPTER P TEST 133

I Functions and Graphs 135
I.1 Graphs and Graphing Utilities 136
I.2 Basics of Functions and Their Graphs 147
I.3 More on Functions and Their Graphs 164
I.4 Linear Functions and Slope 178
I.5 More on Slope 192
Mid-Chapter Check Point 203
I.6 Transformations of Functions 204
I.7 Combinations of Functions; Composite Functions 220
I.8 Inverse Functions 232
I.9 Distance and Midpoint Formulas; Circles 243
I.10 Modeling with Functions 252
SUMMARY, REVIEW, AND TEST 267
REVIEW EXERCISES 269
CHAPTER I TEST 275
2 Polynomial and Rational Functions 277
  2.1 Complex Numbers 278
  2.2 Quadratic Functions 286
  2.3 Polynomial Functions and Their Graphs 302
  2.4 Dividing Polynomials: Remainder and Factor Theorems 316
  2.5 Zeros of Polynomial Functions 326
     Mid-Chapter Check Point 339
  2.6 Rational Functions and Their Graphs 340
  2.7 Polynomial and Rational Inequalities 359
  2.8 Modeling Using Variation 369
SUMMARY, REVIEW, AND TEST 379
REVIEW EXERCISES 381
CHAPTER 2 TEST 385
CUMULATIVE REVIEW EXERCISES
     (CHAPTERS P–2) 386

4 Trigonometric Functions 459
  4.1 Angles and Radian Measure 460
  4.2 Trigonometric Functions:
     The Unit Circle 475
  4.3 Right Triangle Trigonometry 489
  4.4 Trigonometric Functions of Any Angle 501
     Mid-Chapter Check Point 514
  4.5 Graphs of Sine and Cosine Functions 515
  4.6 Graphs of Other Trigonometric Functions 537
  4.7 Inverse Trigonometric Functions 550
  4.8 Applications of Trigonometric Functions 566
SUMMARY, REVIEW, AND TEST 577
REVIEW EXERCISES 580
CHAPTER 4 TEST 583
CUMULATIVE REVIEW EXERCISES
     (CHAPTERS P–4) 584

3 Exponential and Logarithmic Functions 387
  3.1 Exponential Functions 388
  3.2 Logarithmic Functions 400
  3.3 Properties of Logarithms 413
     Mid-Chapter Check Point 423
  3.4 Exponential and Logarithmic Equations 423
  3.5 Exponential Growth and Decay; Modeling Data 436
SUMMARY, REVIEW, AND TEST 452
REVIEW EXERCISES 453
CHAPTER 3 TEST 457
CUMULATIVE REVIEW EXERCISES
     (CHAPTERS P–3) 458

5 Analytic Trigonometry 585
  5.1 Verifying Trigonometric Identities 586
  5.2 Sum and Difference Formulas 596
  5.3 Double-Angle, Power-Reducing, and Half-Angle Formulas 607
     Mid-Chapter Check Point 618
  5.4 Product-to-Sum and Sum-to-Product Formulas 619
  5.5 Trigonometric Equations 626
SUMMARY, REVIEW, AND TEST 639
REVIEW EXERCISES 640
CHAPTER 5 TEST 642
CUMULATIVE REVIEW EXERCISES
     (CHAPTERS P–5) 642
6 Additional Topics in Trigonometry 643
6.1 The Law of Sines 644
6.2 The Law of Cosines 656
6.3 Polar Coordinates 664
6.4 Graphs of Polar Equations 675
Mid-Chapter Check Point 685
6.5 Complex Numbers in Polar Form; DeMoivre’s Theorem 686
6.6 Vectors 698
6.7 The Dot Product 713
SUMMARY, REVIEW, AND TEST 721
REVIEW EXERCISES 723
CHAPTER 6 TEST 725
CUMULATIVE REVIEW EXERCISES (CHAPTERS P–6) 726

7 Systems of Equations and Inequalities 727
7.1 Systems of Linear Equations in Two Variables 728
7.2 Systems of Linear Equations in Three Variables 748
7.3 Partial Fractions 756
7.4 Systems of Nonlinear Equations in Two Variables 767
Mid-Chapter Check Point 777
7.5 Systems of Inequalities 778
7.6 Linear Programming 790
SUMMARY, REVIEW, AND TEST 798
REVIEW EXERCISES 799
CHAPTER 7 TEST 802
CUMULATIVE REVIEW EXERCISES (CHAPTERS P–7) 803

8 Matrices and Determinants 805
8.1 Matrix Solutions to Linear Systems 806
8.2 Inconsistent and Dependent Systems and Their Applications 818
8.3 Matrix Operations and Their Applications 827
Mid-Chapter Check Point 842
8.4 Multiplicative Inverses of Matrices and Matrix Equations 842
8.5 Determinants and Cramer’s Rule 856
SUMMARY, REVIEW, AND TEST 868
REVIEW EXERCISES 869
CHAPTER 8 TEST 871
CUMULATIVE REVIEW EXERCISES (CHAPTERS P–8) 872

9 Conic Sections and Analytic Geometry 873
9.1 The Ellipse 874
9.2 The Hyperbola 886
9.3 The Parabola 900
Mid-Chapter Check Point 912
9.4 Rotation of Axes 913
9.5 Parametric Equations 925
9.6 Conic Sections in Polar Coordinates 935
SUMMARY, REVIEW, AND TEST 944
REVIEW EXERCISES 946
CHAPTER 9 TEST 948
CUMULATIVE REVIEW EXERCISES (CHAPTERS P–9) 949
Shaded chapters are available in Blitzer, *Precalculus, Fourth Edition*.

10 Sequences, Induction, and Probability 951

10.1 Sequences and Summation Notation 952
10.2 Arithmetic Sequences 963
10.3 Geometric Sequences and Series 972

Mid-Chapter Check Point 986

10.4 Mathematical Induction 987
10.5 The Binomial Theorem 996
10.6 Counting Principles, Permutations, and Combinations 1003
10.7 Probability 1015

SUMMARY, REVIEW, AND TEST 1029
REVIEW EXERCISES 1031
CHAPTER 10 TEST 1034
CUMULATIVE REVIEW EXERCISES (CHAPTERS P-10) 1035

11 Introduction to Calculus 1037

11.1 Finding Limits Using Tables and Graphs 1038
11.2 Finding Limits Using Properties of Limits 1050
11.3 Limits and Continuity 1062

Mid-Chapter Check Point 1069

11.4 Introduction to Derivatives 1070
SUMMARY, REVIEW, AND TEST 1083
REVIEW EXERCISES 1084
CHAPTER 11 TEST 1085
CUMULATIVE REVIEW EXERCISES (CHAPTERS P-11) 1086

Appendix A Where Did That Come From?
Selected Proofs A-1

Appendix B The Transition from
Precalculus to Calculus B-1

Answers to Selected Exercises AA1
Subject Index I-1
Photo Credits P-1