## Term Information

Effective Term

## General Information

Course Bulletin Listing/Subject Area
Fiscal Unit/Academic Org
College/Academic Group
Level/Career
Course Number/Catalog
Course Title
Transcript Abbreviation
Course Description

## Semester Credit Hours/Units

## Offering Information

Length Of Course
Flexibly Scheduled Course
Does any section of this course have a distance No
education component?
Grading Basis
Repeatable
Course Components
Grade Roster Component
Credit Available by Exam
Admission Condition Course
Off Campus
Campus of Offering

Spring 2014

Mathematics
Mathematics - D0671
Arts and Sciences
Undergraduate
1060
Supplementary Pre-College Mathematics
Supp Pre-Coll Math
Math 1060 is a terminal math course designed to satisfy the Quantitative Reasoning: Basic Computation category of the General Education Requirement (GE). Students may follow-up with Math 1116 to satisfy the Mathematical or Logical Analysis category of the General Education Requirement (GE). Students who wish to take further mathematics courses should take Math 1075 rather than Math 1060.
Fixed: 2

## Prerequisites and Exclusions

Prerequisites/Corequisites
Exclusions

Prereq: Math placement level S; or C- or better in 1050.
Not open to students with credit for any higher numbered math class, or for any quarter class numbered higher than 50 .

## Cross-Listings

## Cross-Listings

## Subject/CIP Code

## Subject/CIP Code <br> Subsidy Level

27.0101

Intended Rank

Developmental Course
Freshman

## Requirement/Elective Designation

## General Education course:

Basic Computation

## Course Details

Course goals or learning objectives/outcomes

## Attachments

## Comments

- Recognize Rational and Radical Expressions.
- Recognize Rational, Radical and Quadratic Equations.
- Manipulate Rational and Radical Expressions using Algebra.
- Solve Equations Involving Rational and Radical Expressions.
- Solve Quadratic Equations using Algebra.
- Solve Applied Problems Involving Rational Expressions and Quadratic Equations.
- Addition, subtraction, multiplication and division of rational expressions
- Equations containing fractions, variation and applied rational expression problems
- Addition, subtraction, multiplication and division of radical expressions
- Solving equations containing radical expressions
- Solving quadratic equations by factoring, taking roots, completing the square or using the quadratic formula
- Complex numbers
- Applied problems involving quadratic equations
- 1060-Supplementary_Pre-college_Mathematics_syllabus.pdf: Syllabus
(Syllabus. Owner: Husen, William J)
- Math 1060 GE Rationale - Revised.pdf: GE Rationale Statement
(GEC Model Curriculum Compliance Stmt. Owner: Husen,William J)
- Math 1060 GE Assesment - Revised.pdf: GE Assessment Plan
(GEC Course Assessment Plan. Owner: Husen,William J)
- Please flesh out GE rationale and GE assessment plan (see e-mail). (by Vankeerbergen,Bernadette Chantal on 08/02/2013 03:33 PM)


## Workflow Information

| Status | User(s) | Date/Time | Step |
| :--- | :--- | :--- | :--- |
| Submitted | Husen,William J | $06 / 13 / 2013$ 10:41 AM | Submitted for Approval |
| Approved | Husen,William J | $06 / 13 / 201310: 43 \mathrm{AM}$ | Unit Approval |
| Approved | Hadad,Christopher <br> Martin | $06 / 13 / 2013$ 10:47 AM | College Approval |
| Revision Requested | Vankeerbergen,Bernadet <br> te Chantal | $06 / 25 / 2013$ 08:30 AM | ASCCAO Approval |
| Submitted | Husen,William J | $07 / 29 / 201311: 49 \mathrm{AM}$ | Submitted for Approval |
| Approved | Husen,William J | $07 / 29 / 201311: 50 \mathrm{AM}$ | Unit Approval |
| Approved | Hadad,Christopher <br> Martin | $08 / 01 / 2013$ 08:09 PM | College Approval |
| Revision Requested | Vankeerbergen,Bernadet <br> te Chantal | $08 / 02 / 2013$ 03:33 PM | ASCCAO Approval |
| Submitted | Husen,William J | $08 / 08 / 2013$ 03:42 PM | Submitted for Approval |
| Approved | Husen,William J | $08 / 08 / 201303: 42$ PM | Unit Approval |
| Approved | Hadad,Christopher <br> Martin | $08 / 08 / 2013$ 04:59 PM | College Approval |
| Pending Approval | Vankeerbergen,Bernadet <br> te Chantal <br> Nolen,Dawn <br> Jenkins,Mary Ellen Bigler <br> Hogle,Danielle Nicole <br> Hanlin,Deborah Kay | $08 / 08 / 2013$ 04:59 PM | ASCCAO Approval |

# Supplementary Pre-College Mathematics <br> Math 1060 

Math 1060 is a terminal math course designed to satisfy the Quantitative Reasoning: Basic Computation category of the General Education Requirement (GE). Students may follow-up with Math 1116 to satisfy the Quantitative Reasoning: Mathematical or Logical Analysis category of the General Education Requirement (GE). Students who wish to take further mathematics courses should take Math 1075 rather than Math 1060.

## Math 1060: Supplementary Pre-College Mathematics

Catalog Description: Rational and radical expressions and equations; quadratic equations; applications.

Credits: 2
Purpose of Course: This course is only for students intending to take no further mathematics, with the possible exception of Math 1116. In particular, students intending to take Math 1075 should not take this course.

Follow-up Courses: Math 1116
Textbook: Beginning Algebra, $8^{\text {th }}$ edition, by Aufmann \& Lockwood, (Cengage). ISBN: 9781285101279.

Prerequisite: Math placement level S; or C- or better in 1050.
Exclusions: Not open to students with credit for any higher numbered math class, or for any quarter class numbered higher than 50.

Grading: A student's grade will be based on the student's performance on homework and exams. Homework, in total, will count for 100 points. There will be two midterms exams, worth 100 points each and a final exam, worth 200 points. Grades will be assigned on the percentage of points received out of 500 total points.

## Learning Goals:

- Recognize Rational and Radical Expressions.
- Recognize Rational, Radical and Quadratic Equations.
- Manipulate Rational and Radical Expressions using Algebra.
- Solve Equations Involving Rational and Radical Expressions.
- Solve Quadratic Equations using Algebra.
- Solve Applied Problems Involving Rational Expressions and Quadratic Equations.


## Topics:

9.1 Multiplication and Division of Rational Expressions.
9.2 Expressing Fractions in Terms of the LCD.
9.3 Addition and Subtraction of Rational Expressions.
9.4 Complex Fractions.
9.5 Equations Containing Fractions.
9.6 Variation.
9.8 Applied Problems.

Midterm 1
10.1 Introduction to Radical Expressions.
10.2 Addition and Subtraction of Radical Expressions.
10.3 Multiplication and Division of Radical Expressions.
10.4 Solving Equations Containing Radical Expressions.

Midterm 2
11.1 Solving Quadratic Equations by Factoring or Taking Square Roots.
11.2 Solving Quadratic Equations by Completing the Square.
11.3 Solving Quadratic Equations Using the Quadratic Formula.
11.4 Complex Numbers.
11.6 Applied Problems.

Final Exam

## GE Information:

This Mathematics course can be used, depending on your degree program, to satisfy the Quantitative Reasoning: Basic Computation category of the General Education Requirement (GE). The goals and learning objectives for this category are:

Goals: Students develop skills in quantitative literacy and logical reasoning, including the ability to identify valid arguments, and use mathematical models.

Learning objectives: Students demonstrate computational skills and familiarity with algebra and geometry, and apply these skills to practical problems.

## Disability Statement:

> Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone (614) 292-3307 and VRS (614) 429-1334; webpage http://www.ods.ohio-state.edu.

## Academic Misconduct Statement:

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term academic misconduct includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct: http://studentaffairs.osu.edu/resource csc.asp

## Math 1060 GE Rationale Statement

GE Category: Quantitative Reasoning - Basic Computation
Goals of the Quantitative Reasoning GE Category:
Students develop skills in quantitative literacy and logical reasoning, including the ability to identify valid arguments, and use mathematical models.

Expected Learning Outcomes of the Basic Computation GE Subcategory:
Students demonstrate computational skills and familiarity with algebra and geometry, and apply these skills to practical problems.

Currently, the Basic Computation GE requirement is generally met by placing at level $R$ on the mathematics placement exam or after successfully completing Math 1075. For many degree programs, additional mathematics will be necessary beyond Math 1075 (for which placement beyond Math 1075 or credit for Math 1075 is a prerequisite), thus such students will satisfy the Basic Computation requirement in the normal sequence of the math courses they take. For example, any Engineering major will need several calculus courses - courses well beyond Math 1075. Likewise, BS majors in ASC need at least Math 1151 as part of their GE requirement (specifically Quantitative Reasoning - Mathematical and Logical Analysis). Additionally, due to the recent Remediation-Free guarantee as adopted by The Ohio State University, students with certain minimal standardized test scores (e.g. ACT math sub-score of 22 or higher) are deemed remediation free regardless of their math placement score. They are then allowed to enroll in Math 1130 or Math 1148. Consequently they are also deemed to have satisfied the Basic Computation GE requirement.

There is a disconnect between math placement level $R$ and Math 1075. Students who place at level R must take Math 1075 if they wish to take any higher-level math course; however they are considered to have satisfied the Basic Computation GE. This is essentially a result of the semester conversion. It should be noted that Math 1075 is the semester version of Math 104 along with some parts of Math 075 . Under quarters, a student who placed at level R would be deemed to have satisfied the level of Math 075 and be placed into Math 104. So requiring Math 1075 to satisfy the Basic Computation GE represents a "raising of the bar" for this GE (over the corresponding GEC); however, the corresponding math placement level $R$ under semesters is at the same level as the quarter GEC. Unfortunately there is a population of students who are trapped by this increased standard who would nevertheless be able to place at math placement level $R$ after they successfully completed the old quarter course Math 075 (if students were allowed to retest on the math placement exam). Math 1060 is designed to serve this population of students, and serves as a realignment between course level and placement level. Essentially Math 1060 is the semester version of Math 075 . Students who take Math 1060 would then take a course from the Quantitative Reasoning - Mathematical and Logical Analysis GE subcategory to finish out the Quantitative Reasoning GE category. There is a liberal arts mathematics course that satisfies this second subcategory, namely Math 1116. Math 1116 has been designed to accommodate students with a pre-requisite of Math 075, hence Math 1060 would serve as a prerequisite. It should be noted that students who wish to take further mathematics would take Math 1075 rather than Math 1060 as their Basic Computation GE course. Therefore Math 1060 serves as a terminal math course or as the next to last math course in the Math 1060 - Math 1116 sequence.

## 1. How do the course objectives address the GE category expected learning outcomes?

The course objectives of Math 1060 directly address the goal of both the Quantitative Reasoning GE category and the Basic Computation GE sub-category. In particular, the course objectives focus on recognizing, manipulating and solving rational, radical and quadratic equations. These provide students with some of the basic mathematical tools that are required in most fields of study, mathematical or otherwise. Furthermore, it is a course objective that students can use these tools on a variety of applied (practical problems). A student who has met the course objectives will have developed and demonstrated these computational skills. These course objectives do not exhaust the topics of a high-school Algebra 2 class, but they do address a large portion of these topics (primarily omitting functions).

## 2. How do the readings assigned address the GE category expected learning outcomes?

Students will possess detailed course calendars. They will be expected to read each section of the textbook before coming to the corresponding lecture class. Moreover they are encouraged to begin working on problems. Students who familiarize themselves with the material before lecture are able to make the most out of each in class lecture. Currently there are no plans to implement pre-lecture assignments, say in the form of short quizzes on the material they are expected to review before each lecture; however, these may become part of the course in the future.

## 3. How do the topics address the GE category expected learning outcomes?

Recall that the essential learning outcomes are for students to demonstrate computational skills and familiarity with algebra and geometry and apply these to practical problems. The topics address these learning outcomes in the following ways. First, there is the algebra of rational expressions. These are essentially the polynomial analog of fractions and these occur naturally as ratios of different polynomial expressions (say in similar triangles with unknowns). This is followed-up with learning how to solve equations that involve rational expressions. This skill is then applied to solving practical problems (typically word problems). This process of learning algebra, then learning to solve equations, and then learning to solve applied problems is done with radical expressions (expressions involving square roots). Both rational and radical expressions are common throughout the work that students will encounter in further classes, and these are skills that will be honed in Math 1060. Furthermore, quadratic equations are treated by learning to solve them using various methods. Students then learn to solve various applied problems that involve quadratics. Again, the skills learned here are essential to problems that arise naturally. Successful students will learn the basic computational skills of mathematics and they will be able to apply them to a variety of practical problems.
4. How do the written assignments address the GE category expected learning outcomes?

Some of what the students learn in Math 1060 could be called mechanical skills: how to manipulate various mathematical expressions and solve equations involving these expressions. This is the essence of becoming proficient with these basic computational skills. These skills are honed by repetition, and the written homework will drill these skills. Students will be expected to perform algebraic manipulations of several similar, but slightly different expressions. This is to reinforce the subtleties of the mathematics, and to focus the students on efficiently working through these manipulations. The same is true for being able to solve various equations. Students need to see many varieties of equations in order to become comfortable with them. Students that successfully complete these homework questions should be able to efficiently perform algebra on various expressions and equations and produce correct solutions. This is a demonstration that they can do the basic computational skills required by this GE.

There are also written homework questions that are applied problems. These are essentially story problems that ultimately involved the ideas that have been developed in the course. For example, the following problem will require a student to produce a rational equation and then solve it:

One technician can wire a security alarm in 4 hours, whereas it takes 6 hours for a second technician to do the same job. After working alone for 2 hours, the first technician quits. How long will it take the second technician to complete the job?
Again, there are several varieties of these, and the students will be expected to be able to solve all varieties. A successful student working on these problems will demonstrate an ability to apply the computational skills learned in this course to practical problems.

## Math 1060 GE Assessment Plan

Math 1060 will primarily assessed through direct methods. Individual students will be required to work through several homework assignments. The scoring on these will be against a rubric and based on the expected progress through each problem on a given assignment, and against proper mathematical procedures. A student who gets the "right answer" but uses a (mathematically) incorrect method receives little to no credit for such an answer. This is to ensure that students are correctly applying the computational skills that they are expected to learn. In addition to these homework assignments, there will be two midterm exams and a final exam. These exams present the student with problems that are similar to homework assignment problems, and the students are expected to work them accordingly. Exams provide an opportunity to assess the knowledge learned but also the efficiency with which a student can work. Exam rubrics will be similar to those used on homework, in particular exams will be short answer and not multiple-choice. Exams will also contain some problems of a more conceptual nature. These will give a good indication of how a student will be able to apply the computation skills that are to be learned.

A typical series of exam questions would include a few questions where the students are required to directly manipulate an expression (rational or radical). Additional questions would follow that require a student to provide a solution to an equation (rational, radical or quadratic). The methods that they need to use to solve these equations are the manipulations that are demonstrated in the first variety. Finally, there are applied problems. These problems require thought and skill at many levels. Perhaps the most challenging part of such problems for students is to take one of these the problem and turn it into an equation that they can solve. In some sense, these questions require the students to use most of the mathematical skills that they have learned to this point and are the closest to real-world problems.

An additional measurement that will be used is a standardized, multiple-choice exam that is given before the course begins and at the end of the course. It will not affect the students' grades, rather it will serve as a indicator of how well the students are developing their knowledge verses a known standard.

In order to assess Math 1060 as a whole, the course coordinator will closely monitor this course. They will regularly collect data including students' grades and the scores on the standardized before course-after course exam. The course will be considered successful as long as $70 \%$ of the aggregate student grades are at the passing level. Moreover, an additional indicator of success will be how well student knowledge is being improved as indicated by the standardized before course-after course exam. If the students are consistently moving to what might be considered the equivalent of the math placement $R$-level, then the course will be seen as fulfilling its role in satisfying the Basic Computation GE requirement.

If the data indicate that there are weaknesses in Math 1060, then the course coordinator will bring this issue before the Undergraduate Committee in the Department of Mathematics for discussion. Any changes that are approved the committee will be implemented as appropriate.

