

GENERAL EDUCATION COURSE PROPOSAL  
WEBER STATE UNIVERSITY  
QUANTITATIVE LITERACY

Area: **QUANTITATIVE LITERACY (QL)**

Date: 9/14/2011

College: Science

Department: Mathematics

Catalog Abbreviation: MATH QL1030

Catalog Title: Contemporary Mathematics

Course Number: Math QL 1030

Credit Hours: 3

Substantive:         

New:         

Revised:         

Renewal X

Effective Date 7/1/2011

Course description as you want it to appear in the catalog:

Current Catalog description:

Topics from mathematics which convey to the student the beauty and utility of mathematics, and which illustrate its application to modern society. Topics include geometry, statistics, probability, and growth and form.

## QUANTITATIVE LITERACY (QL) GENERAL EDUCATION MISSION STATEMENT

*It is the mission of Weber State University to produce graduates that can reason quantitatively within the context of their majors and career goals. This includes understanding information and reasoning that is numerical, geometric, algebraic, graphical, and statistical -- and at the level of sophistication of college algebra (e.g. MATH 1050).*

## QUANTITATIVE LITERACY LEARNING OUTCOMES

A student completing a Quantitative Literacy general education course should be able to demonstrate a reasonable understanding of the following core objectives.

*Provide a justification of how the proposed course prepares students to successfully demonstrate competency in EACH of the core objectives. Cite specific lecture topics, written assignments, and/or lab projects and explain how they address each of the core competencies. Refer to your attached syllabus as needed.*

*Objective 1:* Interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them.

Justification: All of the topics covered in Math 1030 are developed and explained with formulas, graphs, and diagrams. For example, formulas are discussed for compound interest, annuities and amortization, dimensional analysis, permutations and combinations, probability, measures of central tendency, dispersion, and normal distributions among others. Graphs and tables of values are used in the discussion of linear, quadratic and exponential equations. In addition, histograms, bar graphs and box plots are used in statistical analysis.

*Objective 2:* Represent mathematical information symbolically, visually, numerically, and verbally.

Justification: Topics like quadratic, exponential, logarithmic, and logarithmic equations, annuities, amortization, permutations and combinations, measures of central tendency and dispersion, etc. deal with the symbolic representation of mathematical information. Topics like the graphs of quadratic functions, bar graphs, and histograms teach students about visual representations. Data and frequency tables illustrate important numerical representations in mathematics. A number of important definitions and applied problems also show how mathematical information can be presented verbally.

*Objective 3:* Use arithmetical, algebraic, geometric, and statistical methods to solve problems.

Justification: Various methods for solving problems are discussed in Math 1030. Solving even an elementary linear equation requires arithmetic methods. As an example, when solving problems in the mathematics of finance (annuities and amortization), students learn how to use algebraic methods to solve important applied problems. A number of topics in Contemporary Mathematics, including problems that involve calculating perimeters, areas, volumes, and surface areas, illustrate applications in Geometry. Topics such as counting, permutations and combinations, probability, measures of central tendency, and dispersion show probabilistic/statistical techniques solving problems.

*Objective 4:* Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.

Justification: In Contemporary Mathematics, students are taught not only how to check correctness of answers, say, solving algebraic equations or checking whether a solution is reasonable, but also how to estimate solutions when they cannot be obtained explicitly. For example, the sample standard deviation can be used to estimate the dispersion of normal distributions. It is important to know that alternative methods exist to solve a

given problem. This objective is illustrated by the ability to solve some counting problems utilizing either the fundamental counting principle or the permutation formula. The topic of Modeling with Quadratic Equations shows how to select an optimal result for quantities expressed by quadratic equations.

*Objective 5:* Recognize that mathematical and statistical methods have limits.

Justification: Modeling data with linear, quadratic, exponential, and logarithmic equations are helpful for predicting but by no means diagnostic. Probabilistic models are helpful for predictions, but have inherent uncertainties. Calculating the probabilities of events involves the major assumption of equally likely outcomes. However, in practice outcomes are seldom equally likely. Thus, calculations involving the probabilities of events do have limitations. Statistical models, like the normal distribution, again are helpful for predictions, but also have limitations. Limitations also exist when mathematical models are used to solve physical problems as the model only includes the most important features of the application.

### COMPLETE THE FOLLOWING

1. Has this proposal been discussed with and approved by the department?

This Proposal has been discussed and unanimously approved by the department.

2. List those general education courses in other departments with similar subject matter and explain how this course differs.

There are none.

3. If the proposed new general education course affects course requirements or enrollments in other departments, list the departments and programs involved and attach comments from each.

Not applicable, this is not a new course.

4. Attach a syllabus of the course. Include the number of contact hours per week and the format of these hours (e.g., lecture, lab, field trip, etc.).

See Attachment

### New Courses Only:

5. Discuss how you will assess student learning outcomes associated with this course

### Current General Education Courses and Existing Courses Seeking General Education Status:

6. Discuss how you have assessed the applicable or identified student learning outcomes associated with this course.

### Course Assessment

Assessment of Math 1030, Contemporary Mathematics is mainly done by the department level QL/Lower Division Committee and discussions during department meetings. The following are done:

1. Collection of data on pass rates of the Math QL courses at WSU (and at other state schools if we can obtain that information from the state office).
2. Consideration of alternate texts for the course
3. Consideration and discussions about adjusting course content and the level and extent of problem solving
4. Attendance of the yearly majors meetings organized by the Regent's Majors Committee
5. Teaching evaluations are completed by the students.

### Adjunct Instructors

One or Two Adjunct Instructors instruct sections of Math 1030 each semester. Assessment and oversight of Adjunct Instructors is mainly done by the Department Chair. The department maintains a set of policies for

Adjunct Instructors (it is attached).

The Department Chair does the following:

1. Hold at least one retreat each year for Adjunct Instructors to go over policies, have discussions, and answer questions
2. Review their teaching evaluations and address problems that may arise
3. Review their graded final exams to see if they are covering most of the course material
4. Hold a one on one interview with each instructor to discuss their courses and answer questions

### Student Assessment

Student assessment is accomplished by reading and problem solving assignments, quizzes and exams. All instructors, Faculty and Adjuncts give 3 or 4 Midterm Exams and a Final Exam. The instructors design their own exams. They make up questions and problems similar to those discussed in the course. There may be a few fill in the blank, short answer, multiple choice or true/false questions, but most of the exams consist of questions that require the students to work out the solution and present any pertinent work. The questions are designed to see if they have learned the mathematics in the course, that is to determine if students can correctly use the symbols, understand the graphical or geometric relationships and understand the definitions and properties. There are questions that require students to use arithmetic, algebra and geometry to solve problems. There are questions about setting up and solving applied problems. All instructors grade their own exams. Seldom does a correct answer alone get full credit. Student's work is being checked to see if they can correctly set up and use the language of Math to get to an answer. Some instructors also grade homework and/or quizzes. Some instructors require students to answer questions using Math XL (the computer program used in TERM of the Developmental Math Program.) Others make Math XL available to students but do not require it.

7. How has this assessment information been used to improve student learning?

### Course Assessment

1. Pass rates in Math 1030 are high compared to the other QL Math courses. See the attachment.
2. Each year department representatives attend "Majors Meetings" to coordinate course content, prerequisites, and other aspects of the course with other state schools. Recently this has resulted in our consideration of changes in the prerequisite expirations.
3. We have made two offices available to Adjunct Instructors in which they can meet with students.
4. Tutoring Labs have been instituted. Efforts are beginning to ensure that the tutors have sufficient knowledge to help students enrolled in Math 1030.
5. Each Faculty member reviews their teaching evaluations. The Chair reviews these as well. Student comments are mostly favorable.

### Adjunct Instructor Assessment

1. The reviews of the final exams that Adjunct Instructors give in their courses indicate that they are covering most of the course topics.
2. Student Teaching evaluations indicate that instructors are doing a good job.

GENERAL EDUCATION COURSE APPROVAL PAGE

**Approval Sequence:**

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Department Chair/Date

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Dean of College/Date

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University Curriculum Committee/Date

Passed by Faculty Senate \_\_\_\_\_ Date