1. Submitting College: COST

2. Department(s) Generating The Proposal: Engineering Technology & Mathematics
   Choose an item. (if needed)

3. Proposal Title: Mathematical Modeling for Non-STEM students

4. Course Number(s): MATH 1001

5. Course Title(s): Mathematical Modeling

6. Effective Date: Spring Year: 2012

7. Brief Summary of Proposal: The rationale for this course is stated by the ACMS as follows: The ACMS has been aware of the need for a course that is of sufficient rigor for a college-level offering while providing quantitative reasoning and skills for students who do not need the traditional algebraic studies and has developed a proposal for consideration using the attached USG Common General Education Learning Outcomes and the Mathematical Association of America report as a starting point. It is an attempt to address that segment of the non-STEM student population who need to have the skills necessary for quantitative reasoning that do not involve the symbolic manipulations that are prevalent in College Algebra. This would entail among other outcomes, a fundamental in logic with a view to analyzing arguments, an appreciation and recognition of the validity of various statistical claims distinguishing between those with statistical and practical significance and problem-solving with a view to recognizing valid deductions to enable the student to make appropriate and supportable decisions.

8. Type of Proposal: New Course
   If other, please describe: Click here to enter text.

9. Impact on Library Holdings
   Existing: NA
   Additional: NA
   Deletions: NA

10. Impact on Existing Programs: The existing college algebra course in the department of mathematics is designed for the STEM student population. It does not cover all aspects of mathematics skills needed for social sciences and school of business majoring field disciplines. This course is of sufficient rigor for a college-level offering while providing quantitative reasoning and skills for students who do not need the traditional algebraic studies.

11. Additional Resources Required
   Personnel: NA
   Non-personnel: NA

12. Approvals:
   - Department Curriculum Committee
     Signature ___________________________ Date ________________
   - Department Chair
     Signature ___________________________ Date ________________
   - College Curriculum Committee
     Signature ___________________________ Date ________________
1. **Course Number:** MATH 1001

2. **Course Title:** Mathematics Modeling For Non STEM Majors

3. **Catalogue Description:** This course is an alternative in Area A of the Core Curriculum and is not intended to supply sufficient algebraic background for students who intend to take Precalculus or the calculus sequences for mathematics and science majors. This course places quantitative skills and reasoning in the context of experiences that students will be likely to encounter. It emphasizes processing information in context from a variety of representations, understanding of both the information and the processing, and understanding which conclusions can be reasonably determined.

4. **Rationale:** The rationale for this course is stated by the ACMS as follows: The ACMS has been aware of the need for a course that is of sufficient rigor for a college-level offering while providing quantitative reasoning and skills for students who do not need the traditional algebraic studies and has developed a proposal for consideration using the attached USG Common General Education Learning Outcomes and the Mathematical Association of America report as a starting point.

5. **Credit Hours:** Three

6. **Pre-requisites:** Exemption or completion of Learning Support mathematics required; exemption or completion of Learning Support reading and English recommended.

7. **Syllabus:** Attached

8. **Similarity to or duplication of Existing Courses:** NA


10. **Grading:** See details in the attached syllabus.
Course Credit: This is a three-credit hour course. (3-0-3)

Course Description: This course is an alternative in Area A of the Core Curriculum and is not intended to supply sufficient algebraic background for students who intend to take Precalculus or the calculus sequences for mathematics and science majors. This course places quantitative skills and reasoning in the context of experiences that students will be likely to encounter. It emphasizes processing information in context from a variety of representations, understanding of both the information and the processing, and understanding which conclusions can be reasonably determined.

Prerequisite: Exemption or completion of Learning Support mathematics required; exemption or completion of Learning Support reading and English recommended.

Course Content: Upon entering Math 1001, the student is expected to possess an understanding of Introductory and Intermediate Algebra. No more than two weeks of class time will be spent reviewing topics such as geometry (calculating lengths, areas, perimeters, and volumes), ratio and proportion, approximation (round-off error, significance and accuracy), percentages, relative value, and computations with formulae in order to reinforce the students’ understanding of them.

Required Textbook:

Using and Understanding Mathematics: A Quantitative Reasoning Approach (5th/Ed- access code required) by Bennett and Briggs; Addison-Wesley, 2011.

Course Objectives: Attendance: It is compulsory. You shall not be absent more than 3 times in the whole semester. Excused absences are at the discretion of the instructor within the bounds determined by the institution. As a college student, you should be capable of exercising mature judgment in deciding whether you can, and wish to, learn the material without attending class. Be aware that much of the material should be new and that the results of absences historically make themselves evident on quizzes and exams. You are responsible for anything (including quiz/exam announcements) that takes place during any class. Be aware also that most courses will cover material that will not appear in the textbook.

Assessment Measures: Homework assignments/Quizzes/Exams/Grading/etc.: There will be homework assignments on each chapter-section which will total to be one grade (100 pts). There will be at least 10 quizzes which will total to be one and one-half grade (150 pts). There will be four exams/projects (individual and collaborative) each of which will count as one grade (total 400 points). Of these five grades, drop the lowest.
There will be a comprehensive final exam that will count as two and one-half grades (250 points). Compute your average on the basis of the remaining six grades (700 points). Computer software will be used as a basis for the projects as well as other educational and assessment activities.

**Other Information:** Makeup exams will be given only for sufficient reason (unreadiness is not one) and must take place as soon as possible!

Becoming familiar with the videotapes, books, CAI, computers, and tutorial help and other resources available in the Library would be useful and is strongly recommended.

Get in touch with the instructor at the first sign of trouble. Being a full-time student should entail the same amount of time as having a full-time job - 40/45 hours a week. Since a typical course load is 15 credit hours (12.5 hours in class), this would indicate that an average student with an average background in a course of average difficulty who expects an average ('C') grade should be spending a little more than two hours of work outside class for every hour in class. A grade better than a 'C', a more difficult class, etc. would require correspondingly more work while a grade lower than a 'C' would require less work.

**Topics Covered:**

1. Sets and Set Operations
2. Logic
   - Negations, Quantifiers, Conditional Statements, Converses
   - Inductive and Deductive Reasoning, Valid Arguments
3. Basic Probability
4. Data Analysis
   - Basic Descriptive Statistics (Mean, Median, Mode, Standard Deviation)
   - Correlation, Causality, and Inferences
   - Interpreting Graphical Displays
   - Sampling and Randomness
5. Modeling from Data (Scatter Plots, Regression Lines)
   - Linear Models
   - Quadratic Models
   - Exponential and Logarithmic Models
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<th>Week</th>
<th>Topics</th>
<th>Chapter</th>
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<td>1</td>
<td>Fallacies, propositions, truth values</td>
<td>1A,1B</td>
<td>1-34</td>
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<tr>
<td>2</td>
<td>Sets, Venn diagrams, <em>sets of numbers</em>, analyzing arguments, critical thinking</td>
<td>1C, 1D, 1E</td>
<td>35-80</td>
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<td>3</td>
<td>Units, conversion, <em>fractions</em>, problem-solving using units, <em>powers of 10</em></td>
<td>2A, 2B</td>
<td>81-115</td>
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<td>4</td>
<td>Problem-solving guidelines, Uses (abuses) of percentages, <em>ratios</em>, <em>scientific notation</em>, Exam I</td>
<td>2C, 3A, 3B</td>
<td>116-164</td>
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<td>5</td>
<td>Accuracy vs. precision, <em>rounding</em>, types of errors (random vs. systematic, absolute vs. relative, Type I vs. Type II), index numbers, Simpson's paradox</td>
<td>3C, 3D, 3E</td>
<td>165-202</td>
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<td>6</td>
<td>Fundamentals of statistics, types of samples, population, study vs. experiment, statistical vs. practical significance</td>
<td>5A, 5B</td>
<td>289-314</td>
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<td>7</td>
<td>Tables, graphs, correlation vs. causation, Exam II</td>
<td>5C, 5D, 5E</td>
<td>315-358</td>
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<td>8</td>
<td>Data distribution, measures of variation, normal distribution</td>
<td>6A, 6B, 6C</td>
<td>359-389</td>
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<td>9</td>
<td>Statistical inference, fundamentals of probability, combining probabilities</td>
<td>6D, 7A, 7B</td>
<td>390-427</td>
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<td>10</td>
<td>Law of averages, risk assessment, Exam III</td>
<td>7C, 7D</td>
<td>428-446</td>
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<td>11</td>
<td>Counting, factorials, assigning probabilities, linear growth, quadratic growth, exponential growth, <em>logarithms</em></td>
<td>7E, 8A, worksheet</td>
<td>447-468</td>
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<tr>
<td>12</td>
<td>Functions, linear, quadratic, and exponential models</td>
<td>9A, 9B, 9C, worksheet</td>
<td>499-538</td>
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<td>13-14</td>
<td>Exam IV, Voting and fairness, analysis of elections, apportionment or Exam IV, Plane geometry, perspective and symmetry and Art</td>
<td>Chap 11, Chap 10</td>
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<tr>
<td>15</td>
<td>Review</td>
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Notes:

- *Italicized* topics indicate review material
- Pages listed include problem sets
- Worksheet mentioned in weeks 11, 12 for expanded coverage of quadratic growth models
- Approximately one week of review is incorporated into the course
- Less than two weeks devoted to material beyond the Common Topics for USG
MATH 1001  Learning Outcomes

The primary outcome for a student who successfully completes a MATH 1001 course is the achievement of a certain level of proficiency in using and analyzing quantitative information. The focus is upon the methodology and skills needed to analyze quantitative information for the purpose of making decisions, judgments, and predictions. This will entail defining problems by means of numeric, graphic, or symbolic representations of real-world phenomena, identifying and pursuing methods of solution, deducing consequences, formulating alternatives, and predicting outcomes. To this end, students who successfully complete a MATH 1001 course will:

1. acquire skills that will enable them to construct logical arguments based on rules of inference and to develop strategies for solving quantitative problems;
2. have developed number sense sufficiently to be able to put numbers, expressed in a variety of ways (such as decimal, fraction, percentage, and scientific notation), into perspective;
3. interpret the many different uses and abuses of percentage;
4. state the difference between causation and correlation and be able to interpret statistics presented graphically;
5. write and appropriately use the meaning of central tendency, variation, and the significance of different distributions;
6. identify and appropriately use basic concepts of statistical inference;
7. classify and appropriately use a variety of mathematical models reflecting real-world phenomena. Specifically, a student will be able to distinguish among linear, quadratic and exponential growth models (functions).