School of Mathematical Sciences

☑ New ☐ Revised  COURSE: COS-MATH-104 Contemporary Mathematics

1.0 Course designations and approvals:

<table>
<thead>
<tr>
<th>Required Course Approvals:</th>
<th>Approval Request Date</th>
<th>Approval Grant Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Unit Curriculum Committee</td>
<td>10-1-10</td>
<td>10-6-10</td>
</tr>
<tr>
<td>College Curriculum Committee</td>
<td>11-01-10</td>
<td>11-17-10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional Course Designations:</th>
<th>Yes</th>
<th>No</th>
<th>Approval Request Date</th>
<th>Approval Grant Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>Writing Intensive</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>Honors</td>
<td>✓</td>
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</tbody>
</table>

2.0 Course information:

Course Title: Contemporary Mathematics
Credit Hours: 3
Prerequisite(s): None
Co-requisite(s): None
Course proposed by: School of Mathematical Sciences
Effective date: Fall 2013

<table>
<thead>
<tr>
<th>Contact Hours</th>
<th>Maximum Students/section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>3</td>
</tr>
<tr>
<td>Lab</td>
<td></td>
</tr>
<tr>
<td>Workshop</td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
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</tbody>
</table>

2.1 Course conversion designation: (Please check which applies to this course)

☑ Semester Equivalent (SE) to: 1016-289
☐ Semester Replacement (SR) to:
☐ New

2.2 Semester(s) offered:

☐ Fall ✗ Spring ☐ Summer
☐ Offered every other year only ☐ Other
2.3 Student requirements:

Students required to take this course: (by program and year, as appropriate)
None

Students who might elect to take the course:
Students seeking to fulfill general education requirements.

3.0 Goals of the course: (including rationale for the course, when appropriate)

3.1 To develop an understanding of some of the major ideas in mathematics, as well as some of the application areas in which they arise.

4.0 Course description: (as it will appear in the RIT Catalog, including pre- and co-requisites, semesters offered)

COS-MATH-104 Contemporary Mathematics
This course provides an exploration of assorted mathematical concepts by using a hands-on approach. Topics will be selected from a wide array of fields to show the presence and importance of mathematics in everyday life. (None) Class 3, Credit 3 (S)

5.0 Possible resources: (texts, references, computer packages, etc.)

5.1 C. Miller, V. Heeren and J. Hornsby, Mathematical Ideas, Addison-Wesley, Reading, MA.
5.3 P. Tannenbaum, Excursions In Modern Mathematics with Mini-Excursions, Prentice Hall, Upper Saddle River, NJ.

6.0 Topics: (outline) Topics with an asterisk(*) are at the instructor’s discretion, as time permits
Instructors should select at least 8 of the following 27 topics. As a convenience, topics have been collected under common themes.

6.1 Problem Solving
6.1.1 Techniques
6.1.2 Puzzles

6.2 Foundations of Mathematics
6.2.1 Sets
6.2.2 Logic

6.3 Discrete Probability
6.3.1 Counting
6.3.2 Permutations and combinations
6.3.3 Unconditional and conditional probability

6.4 Graph Theory
6.4.1 Eulerian paths and circuits
6.4.2 Hamiltonian paths and circuits
6.4.3 Networks and trees

6.5 Number Theory
6.5.1 Modular arithmetic
6.5.2 Cryptography
6.5.3 Check digit schemes

6.6 Geometry and Art
6.6.1 Fractals
6.6.2 Tilings and symmetry
6.6.3 Polyhedra
6.6.4 Topology
6.6.5 Knots

6.7 Patterns and Sequences
6.7.1 Fibonacci numbers
6.7.2 Pascal’s triangle
6.7.3 Recursive and explicit sequences

6.8 Consumer Mathematics
6.8.1 Simple and compound interest
6.8.2 Annuities and sinking funds
6.8.3 Amortized loans

6.9 Decision Making
6.9.1 Game theory
6.9.2 Voting schemes

7.0 Intended learning outcomes and associated assessment methods of those outcomes:

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Recognize and interpret various mathematical models, and use these models to make predictions when appropriate</td>
<td>✔✔</td>
</tr>
<tr>
<td>7.2 Use mathematical techniques to examine and solve problems appropriate to the particular topics covered in the class</td>
<td>✔✔</td>
</tr>
<tr>
<td>7.3 Explain the mathematical concepts covered in the class</td>
<td>✔✔</td>
</tr>
</tbody>
</table>

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8.0 Program goals supported by this course:

8.1 To develop an understanding of the mathematical framework that supports engineering, science, and mathematics.
8.2 To develop critical and analytical thinking.
8.3 To develop an appropriate level of mathematical literacy and competency.
8.4 To provide an acquaintance with mathematical notation used to express physical and natural laws.

9.0 General education learning outcomes and/or goals supported by this course:

<table>
<thead>
<tr>
<th>General Education Learning Outcomes</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Homework</td>
</tr>
</tbody>
</table>

9.1 Communication

Express themselves effectively in common college-level written forms using standard American English

Revise and improve written and visual content

Express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)

Comprehend information accessed through reading and discussion

9.2 Intellectual Inquiry

Review, assess, and draw conclusions about hypotheses and theories

Analyze arguments, in relation to their premises, assumptions, contexts, and conclusions

Construct logical and reasonable arguments that include anticipation of counterarguments

Use relevant evidence gathered through accepted scholarly methods and properly acknowledge sources of information

9.3 Ethical, Social and Global Awareness

Analyze similarities and differences in human experiences and consequent perspectives

Examine connections among the world’s populations

Identify contemporary ethical questions and relevant stakeholder positions
### General Education Learning Outcomes

#### 9.4 Scientific, Mathematical and Technological Literacy

<table>
<thead>
<tr>
<th>Action</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain basic principles and concepts of one of the natural sciences</td>
<td></td>
</tr>
<tr>
<td>Apply methods of scientific inquiry and problem solving to contemporary issues</td>
<td></td>
</tr>
<tr>
<td>✓ Comprehend and evaluate mathematical and statistical information</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>✓ Perform college-level mathematical operations on quantitative data</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Describe the potential and the limitations of technology</td>
<td></td>
</tr>
<tr>
<td>Use appropriate technology to achieve desired outcomes</td>
<td></td>
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</tbody>
</table>

#### 9.5 Creativity, Innovation and Artistic Literacy

<table>
<thead>
<tr>
<th>Action</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate creative/innovative approaches to course-based assignments or projects</td>
<td></td>
</tr>
<tr>
<td>Interpret and evaluate artistic expression considering the cultural context in which it was created</td>
<td></td>
</tr>
</tbody>
</table>

#### 10.0 Other relevant information:

(such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

None