

CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

COURSE MODIFICATION PROPOSAL

Courses must be submitted by October 15, 2012, and finalized by the end of the fall semester to make the next catalog (2013-14) production

DATE (CHANGE DATE EACH TIME REVISED): 10/1/12; REV 12.3.12GE; REV 12.5.12

PROGRAM AREA(S): MATH/PHIL

Directions: All of sections of this form must be completed for course modifications. Use **YELLOWED** areas to enter data. All documents are stand alone sources of course information.

1. Indicate Changes and Justification for Each. [Mark all change areas that apply and follow with justification. Be as brief as possible but, use as much space as necessary.]

<input type="checkbox"/> Course title	X Course Content
X Prefix/suffix	X Course Learning Outcomes
<input type="checkbox"/> Course number	X References
Units	<input type="checkbox"/> GE
Staffing formula and enrollment limits	Other <input type="checkbox"/>
Prerequisites/Corequisites	<input type="checkbox"/> Reactivate Course
Catalog description	
Mode of Instruction	

Justification: The course is an interdisciplinary course in philosophy and mathematics and is an elective for the Mathematics major and for the proposed Philosophy minor. The course learning outcomes have been made more in line with SP 06-06 and the course content has been cleaned up a little. I replaced two reference with two other reference that I have used for the course.

2. Course Information.

[Follow accepted catalog format.] (Add additional prefixes if cross-listed)

OLD

Prefix MATH Course# 438
 Title Philosophy of Mathematics Units (3)
 3 hours lecture per week
☐ hours blank per week

☐ Prerequisites: ☐
 Consent of Instructor Required for Enrollment
☐ Corequisites: ☐

Catalog Description (Do not use any symbols):

Topics include infinity, paradoxes, Goedel's incompleteness theorems, whether mathematics is discovered or invented, why mathematical knowledge requires proof, whether mathematics is objective truth or social convention, and the identification of types of mathematical objects.

General Education Categories: A3, B3, UD

Grading Scheme (Select one below):

X A – F

☐ Credit/No Credit

☐ Optional (Student's Choice)

Repeatable for up to ☐ units

Total Completions ☐

Multiple Enrollment in Same Semester Y/N ☐

Course Level:

X Undergraduate

☐ Post-Baccalaureate

☐ Graduate

NEW

Prefix **MATH/PHIL** 438 Units (3)
 Title Philosophy of Mathematics Units (3)
 3 hours lecture per week
☐ hours blank per week

☐ Prerequisites: ☐
 Consent of Instructor Required for Enrollment
☐ Corequisites: ☐

Catalog Description (Do not use any symbols):

Topics include infinity, paradoxes, Goedel's incompleteness theorems, whether mathematics is discovered or invented, why mathematical knowledge requires proof, whether mathematics is objective truth or social convention, and the identification of types of mathematical objects.

General Education Categories: A3, B3, UD

Grading Scheme (Select one below):

X A – F

☐ Credit/No Credit

☐ Optional (Student's Choice)

Repeatable for up to ☐ units

Total Completions ☐

Multiple Enrollment in Same Semester Y/N ☐

Course Level:

X Undergraduate

☐ Post-Baccalaureate

☐ Graduate

3. Mode of Instruction (Hours per Unit are defaulted)

Hegis Code(s) _____
(Provided by the Dean)

Existing

Proposed

	Units	Hours Per Unit	Benchmark Enrollment	Graded		Units	Hours Per Unit	Benchmark Enrollment	Graded	CS No. (filled out by Dean)
Lecture	<u>3</u>	<u>1</u>	<u>25</u>	X	Lecture	<u>3</u>	<u>1</u>	<u>25</u>	X	
Seminar		<u>1</u>			Seminar		<u>1</u>			
Lab		<u>3</u>			Lab		<u>3</u>			
Activity		<u>2</u>			Activity		<u>2</u>			
Field Studies					Field Studies					
Indep Study					Indep Study					
Other blank					Other blank					
Online					Online					

4. Course Attributes:

☐ **General Education Categories:** All courses with GE category notations (including deletions) must be submitted to the GE website: <http://summit.csuci.edu/geapproval>. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

A (English Language, Communication, Critical Thinking)

- ☐ A-1 Oral Communication
- ☐ A-2 English Writing
- X A-3 Critical Thinking

B (Mathematics, Sciences & Technology)

- ☐ B-1 Physical Sciences
- ☐ B-2 Life Sciences – Biology
- X B-3 Mathematics – Mathematics and Applications
- ☐ B-4 Computers and Information Technology

C (Fine Arts, Literature, Languages & Cultures)

- ☐ C-1 Art
- ☐ C-2 Literature Courses
- ☐ C-3a Language
- ☐ C-3b Multicultural

D (Social Perspectives)

E (Human Psychological and Physiological Perspectives)

- X UDIGE/INTD Interdisciplinary
- X Meets University Writing Requirement
- ☐ Meets University Language Requirement

☐ **American Institutions, Title V Section 40404:** ☐ Government ☐ US Constitution ☐ US History
Refer to website, Exec Order 405, for more information: <http://senate.csuci.edu/comm/curriculum/resources.htm>

☐ **Service Learning Course** (Approval from the Center for Community Engagement must be received before you can request this course attribute).

☐ **Online Course** (Answer YES if the course is ALWAYS delivered online).

5. Justification and Requirements for the Course. [Make a brief statement to justify the need for the course]

OLD

☐ Requirement for the Major/Minor
 X Elective for the Major/Minor (Mathematics)

☐ Free Elective

Submit Program Modification if this course changes your program.

NEW

The course is an elective for the Mathematics major/minor and is also an elective for the proposed Philosophy minor.

☐ Requirement for the Major/Minor
 X Elective for the Major/Minor (Philosophy and Mathematics)

☐ Free Elective

6. Student Learning Outcomes. (List in numerical order. Please refer to the Curriculum Committee's "Learning Outcomes" guideline for measurable outcomes that reflect elements of Bloom's Taxonomy: <http://senate.csuci.edu/comm/curriculum/resources.htm>. The committee recommends 4 to 8 student learning outcomes, unless governed by an external agency (e.g., Nursing).

Upon completion of the course, the student will be able to:

OLD

Upon completion, the student will be able to:

- Demonstrate an understanding of various concepts of basic mathematical objects, such as numbers and infinity
- Demonstrate familiarity with various paradoxes and their possible resolutions
- Demonstrate familiarity with axiomatizations of arithmetic set theory, and, formal languages and systems
- Explain the philosophical views of Russell, Cantor, and Goedel
- Critically assess how some philosophers have attempted to address important problems in mathematics
 - Discuss the main philosophies of mathematics, such as Platonism, Formalism, Structuralism, and Humanism
 - Develop and articulate their own views of the important problems in the philosophy of mathematics
- Understand and explore connections between mathematics and philosophy
- Express ideas in the philosophy of mathematics in oral and written form

This course does not satisfy the University Writing or Language Requirements

Upon completion of the course, the student will be able to:

NEW

Upon completion, the student will be able to:

- Demonstrate an understanding of various concepts of basic mathematical objects, such as numbers and infinity
- Demonstrate familiarity with various paradoxes and their possible resolutions
- Demonstrate familiarity with axiomatizations of arithmetic set theory, and, formal languages and systems
- Critically assess how some philosophers have attempted to address important problems in mathematics
 - Discuss the main philosophies of mathematics, such as Platonism, Formalism, Structuralism, and Humanism
 - Deliberate with others and present arguments in the philosophy of mathematics (SP 06-06 Outcome 2.2)
 - Reason inductively and deductively and from a variety of perspectives (SP 06-06 Outcome 2.1)
- Write effectively in various forms (SP 06-06 Outcome 4.2)

7. Course Content in Outline Form. (Be as brief as possible, but use as much space as necessary)

OLD

- Ontological and epistemological questions in the philosophy of mathematics
 - Attempts at forming a foundation for mathematics (Frege, Russel, Peano, Zermelo-Fraenkel)
 - The paradoxes of Russel and Cantor that created difficulties in forming a foundation for mathematics
 - Goedel's Incompleteness Theorem and its philosophical ramifications
 - Attempts of mathematicians and philosophers, both ancient and modern, to address some of the important problems in the philosophy of mathematics
 - Differing philosophies of mathematics, such as Platonism, Fictionalism, Formalism, Structuralism, Humanism, Intuitionism, and Constructivism
 - Further connections between mathematics and philosophy (such as the conflict between mathematical realism and British Empiricism)

NEW

The course will address the following:

- Ontological and epistemological questions in the philosophy of mathematics
 - Attempts at forming a foundation for mathematics (Frege, Russel, Peano, Zermelo-Fraenkel)
 - The paradoxes of Russel and Cantor that created difficulties in forming a foundation for mathematics
 - Goedel's Incompleteness Theorem and its philosophical ramifications
 - Attempts of mathematicians and philosophers, both ancient and modern, to address some of the important problems in the philosophy of mathematics
 - Differing philosophies of mathematics, such as Platonism, Fictionalism, Formalism, Humanism, and Structuralism
 - Further connections between mathematics and philosophy

Does this course content overlap with a course offered in your academic program? Yes ☐

No ☒

If YES, what course(s) and provide a justification of the overlap. ☐

Does this course content overlap a course offered in another academic area? Yes ☐ No ☒

If YES, what course(s) and provide a justification of the overlap. ☐

Overlapping courses require Chairs' signatures.

8. Cross-listed Courses (Please note each prefix in item No. 1)

- A. List cross-listed courses (Signature of Academic Chair(s) of the other academic area(s) is required).
- B. List each cross-listed prefix for the course: MATH/PHIL
- C. Program responsible for staffing: Mathematics

9. References. [Provide 3-5 references]

OLD

Thinking about Mathematics, by Stewart Shapiro, Oxford University Press, 2000.
The Philosophy of Mathematics, W.D. Hart (Editor), Oxford University Press, 1996.
Goedel's Theorem: An Incomplete Guide to its Use and Abuse, by Torkel Franzen, A.K.Peters Ltd., 2005.
Goedel, Escher, Bach: An Eternal Golden Braid, by Douglas Hofstadter, Basic Books, 1999.
What is Mathematics, Really? by Reuben Hersch, Oxford University Press, 1997.

NEW

The Conceptual Roots of Mathematics, by J.R.Lucas, Psychology Press, 1999.
The Infinite, by A.W..Moore, Routledge, 1991.
The Philosophy of Mathematics, W.D. Hart (Editor), Oxford University Press, 1996.
Goedel's Theorem: An Incomplete Guide to its Use and Abuse, by Torkel Franzen, A.K.Peters Ltd., 2005.
Goedel, Escher, Bach: An Eternal Golden Braid, by Douglas Hofstadter, Basic Books, 1999.
What is Mathematics, Really? by Reuben Hersch, Oxford University Press, 1997.

10. Tenure Track Faculty qualified to teach this course.

Jesse Elliott

11. Requested Effective Date or First Semester offered: 2007

12. New Resource Requested: Yes ☐ No ☒

If YES, list the resources needed.

- A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)
☐
- B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)
☐
- C. Facility/Space/Transportation Needs:
☐
- D. Lab Fee Requested: Yes ☐ No ☐ (Refer to the Dean's Office for additional processing)
- E. Other. ☐

13. Will this course modification alter any degree, credential, certificate, or minor in your program? Yes ☐ No ☒

If, YES attach a program update or program modification form for all programs affected.

Priority deadline for New Minors and Programs: **October 1, 2012** of preceding year.

Priority deadline for Course Proposals and Modifications: **October 15, 2012.**

Last day to submit forms to be considered during the current academic year: **April 15th.**

Jesse Elliott

10/1/12

Proposer(s) of Course Modification

Date

Type in name. Signatures will be collected after Curriculum approval.

GE Committee response to your request have MATH438: Philosophy of Mathematics added to A3: Critical Thinking

Approved by 2012-2013 Committee:

Janet Rizzoli

Geoffrey Buhl

Catherine Burriss

Claudio Paiva

Kathy Musashi

Todd Oberson

Debra Hoffmann

Gina Farrar

Rachel Danielson

Request Submitted

Course: MATH438 Philosophy of Mathematics

Area: A3 Critical Thinking

Date Submitted: 10/5/2012 7:26:20 PM

Date Approved: 12/3/2012 2:36:07 PM

1. Prepare the student to use reasoning of both inductive and deductive types

The course already has GE A3 status. See previous entries.

2. Focus on the analysis of written, oral, visual and/or symbolic communication

The course already has GE A3 status. See previous entries.

3. Prepare the student to assess common fallacies in reasoning

The course already has GE A3 status. See previous entries.

4. Address modes of argument, rhetorical perspectives, and the relationship of language to logic

The course already has GE A3 status. See previous entries.

GE Committee response to your request have MATH438: Philosophy of Mathematics added to UDIGE: Upper Division Interdisciplinary GE

Approved by 2012-2013 Committee:

Janet Rizzoli

Geoffrey Buhl

Catherine Burriss

Claudio Paiva

Kathy Musashi

Todd Oberson

Debra Hoffmann

Gina Farrar

Rachel Danielson

Request Submitted

Course: MATH438 Philosophy of Mathematics

Area: UDIGE Upper Division Interdisciplinary GE

Date Submitted: 10/5/2012 7:27:13 PM

Date Approved: 12/3/2012 2:37:46 PM

1. Emphasize interdisciplinarity by integrating content, ideas, and approaches from two or more disciplines

The course already has GE UDIGE status. See previous entries.

2. Include substantive written work consisting of in-class writing as well as outside class writing of revised prose. Examples of appropriate written work include: short papers, long papers, term papers, lab reports, documentation, disciplinary-based letters and memos, and essays.

The course already has GE UDIGE status. See previous entries.

Request for MATH 428: Philosophy of Mathematics to be added to GE Category B3: Mathematics -- Mathematics and Applications.

Committee Response:

Approved by committee on 11-07-2007

Criteria and Justifications Submitted:

- *Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors*
The course studies different conceptions of number and infinity, and what it means to say that mathematical objects like numbers and infinity "exist". The course also studies Godel's incompleteness theorems, which many interpret as saying that there are inherent limitations to mathematics, specifically, that it is impossible to form a complete and rigorous foundation for all of mathematics. The course also asks whether mathematics is indispensable to science.
- *Present mathematical or scientific knowledge in a historical perspective and the influences of math and science on the development of world civilizations, both past and present*
Students will examine at the mathematical and/or philosophical ideas of Pythagoras, Plato and Socrates, Kant, Frege, Russell, Cantor, Godel, and various contemporaries, such as Penelope Maddy, from both philosophical and historical perspectives. Mathematics itself will be considered from historical and socio-cultural perspectives. For example, we examine Mathematical Humanism, which is the philosophy that mathematics makes sense only from a historical and socio-cultural perspective.
- *Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas*
Students will examine and attempt to resolve different paradoxes, such as Russell's paradox and Cantor's paradoxes on infinity. Various uses and misuses of logic, and of Godel's incompleteness theorems, will be considered. Students will apply inductive and deductive reasoning when constructing theses and arguing for them in their writing assignments. They will also learn the process of dialectical reasoning.
- *Promote an understanding of mathematical ideas and problem solving skills*
The mathematical concepts of number, logic and formal systems, set theory, and infinity will be studied. Godel's incompleteness theorems will also be studied. Students will also be given basic mathematical problems on these topics.

Approval Sheet

Course: [REDACTED]

If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

The CI program review process includes a report from the respective department/program on its progress toward accessibility requirement compliance. By signing below, I acknowledge the importance of incorporating accessibility in course design.

Program Chair		
Signature		Date
Program Chair		
Signature		Date
Program Chair		
Signature		Date
General Education Chair		
Signature		Date
Center for Intl Affairs Director		
Signature		Date
Center for Integrative Studies Director		
Signature		Date
Center for Multicultural Engagement Director		
Signature		Date
Center for Civic Engagement and Service Learning Director		
Signature		Date
Curriculum Chair		
Signature		Date
AVP		
Signature		Date