

# MATH 101 Foundations of Mathematics-CrsRvs-2018-02-06

## Form Information

The page you originally access is the global template version. To access the template document that progresses through the workflow, please complete the following steps:

**First Step:** ONLY change the text in the [brackets] so it looks like this: **CRIM 101 Intro to Criminology-CrsRvs-2015-08-10**

- ***If DUAL LISTED list BOTH courses in the page title***

**Second Step:** Click “**SAVE**” on bottom right

- ***DO NOT TYPE ANYTHING INTO THE FIRST PAGE OTHER THAN THE TEXT IN BRACKETS***
- ***Please be sure to remove the Brackets while renaming the page***

**Third Step:** Make sure the word ***DRAFT*** is in yellow at the top of the proposal

**Fourth Step:** Click on “**EDIT CONTENTS**” (*not EDIT*) and start completing the template. When exiting or when done, click “**SAVE**” (*not Save Draft*) on bottom right

When ready to submit click on the workflow icon and hit approve. It will then move to the chair as the next step in the workflow.

## \*Indicates a required field

Proposer*	Alfred Dahma	Proposer Email*	alfy@iup.edu
Contact Person*	Francisco Alarcón	Contact Email*	falarcon@iup.edu
Proposing Department/Unit*	Mathematics	Contact Phone*	7-2608

Course Level*	undergraduate-level
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## Course Revisions

(Check all that apply; fill out categories below as specified; i.e. if only changing a course title, only complete Category A)

Category A:

Category B:

liberal-studies

**\* Teacher Education: Please complete the Teacher Education section of this form (below)**

**\* Liberal Studies: Please complete the Liberal Studies section of this form (below)**

**\* Distance Education: Please complete the Distance Education section of this form (below)**

## Rationale for Proposed Changes (All Categories)

<b>(A) Why is the course being revised/deleted:*</b>	We are revising MATH 101 to align the course with IUP's Expected Student Learning Outcomes and to improve our assessment of this course. In addition, a note will be added in the course prerequisite section to prevent students from taking MATH 101 after successfully completing a math course with larger course number or after placing into DVST 083.
<b>(B) University Senate Summary of Rationale*</b>	<p><b><i>Please enter a single paragraph summary/rationale of changes or proposal for University Senate.</i></b></p> <p>We are revising MATH 101 to align the course with IUP's Expected Student Learning Outcomes and to improve our assessment of this course. In addition, a note will be added in the course prerequisite section to prevent students from taking MATH 101 after successfully completing a math course with larger course number or after placing into DVST 083.</p>
<b>(C) Implications of the change on the program, other programs and the Students:*</b>	none

<b>Current Course Information*</b>	
<b>Category A</b>	
<b>(D) Current Prefix*</b>	MATH
<b>Proposed Prefix</b>	
<b>(E) Current Number*</b>	101
<b>Proposed Number</b>	
<b>(F) Current Course Title*</b>	Foundations of Mathematics
<b>Proposed Course Title</b>	
<b>(G) Prerequisite(s)</b>	None.
<b>Proposed Prerequisite(s)</b>	<p>None.</p> <p>Note: May not be taken after successfully completing a math course with a larger course number without written Mathematics Department chairperson approval. This course also may not be taken by students who place into DVST 083 until successful completion of said course without written Mathematics Department chairperson approval.</p>
<b>(H) Current Catalog Description</b>	Introduces logic and a mathematical way of analyzing problems; develops an appreciation for the nature, breadth, and power of mathematics and its role in a technological society; introduces useful mathematics or mathematics related to student interests. Possible topics include logic, problemsolving, number theory, linear programming, probability, statistics, intuitive calculus, introduction to computers, mathematics of finance, game theory.
<b>Proposed Catalog Description</b>	
<b><i>If changing Category A, no further action required.</i></b>	
<b>Category B (if no change, leave blank)</b>	

<p><b>(I) Repeatable Course</b></p> <p><i>This is for a course that can be repeated</i></p> <p><i>Multiple times e.g. Internship</i></p>	<p>If YES, please complete the following:</p> <p>Number of Credits that May be Repeated:</p> <p>Maximum Number of Credits Allowed to be Repeated:</p>
<p><b>Proposed Repeatable Course</b></p>	<p>If YES, please complete the following:</p> <p>Number of Credits that May be Repeated:</p> <p>Maximum Number of Credits Allowed to be Repeated:</p>
<p><b>(J) Number of Credits</b></p>	<p>Class Hours per week: 3</p> <p>Lab Hours: 0</p> <p>Credits: 3</p>
<p><b>Proposed Number of Credits</b></p>	<p>Class Hours:Lab Hours:Credits:</p>
<p><b>(K) Current Course Student</b></p> <p><b>Learning Outcomes (SLOs)</b></p>	<ol style="list-style-type: none"> <li>1. Use mathematics, inductive and deductive reasoning, and logic to solve real-world problems.</li> <li>2. Apply techniques from a variety of diverse mathematical fields to solve problems.</li> <li>3. Use mathematics as a tool to solve problems, a language to communicate ideas, and an art form to express the beauty in nature.</li> <li>4. Apply mathematical concepts in the area of science, economics, computer technology, and modern society.</li> </ol>

**(L) Proposed Course Student**

**Learning Outcomes (SLOs)**

*For each outcome, describe how*

*the outcome will be achieved*

Note that the text box in the table expands

SLO #	Outcome	How outcome is assessed
1	Use mathematics, inductive and deductive reasoning, and logic to solve real-world problems.	An in-class written assessment (e. g., exam or quiz) and/or an out-of-class assignment (homework, project, writing assignment) will assess the student's ability to use mathematics, inductive and deductive reasoning, and logic to solve problems.
2	Apply common mathematical techniques/principles within the context of distinct topics.	An in-class written assessment (e. g., exam or quiz) and/or an out-of-class assignment (homework, project, writing assignment) will assess the student's ability to apply mathematical techniques to solve problems.
3	Recognize and use connections between mathematics and other disciplines to communicate ideas.	An in-class written assessment (e. g., exam or quiz) and/or an out-of-class assignment (homework, project, writing assignment) will assess the student's ability to use connections between mathematics and other disciplines to communicate ideas.

**(M) Previous Brief Course Outline**

*(It is acceptable to copy*

*from old syllabus)*

***As outlined by the federal definition of a "credit hour", the following should be a consideration***

***regarding student work - For every one hour of classroom or direct faculty instruction,***

***there should be a minimum of two hours of out of class student work.***

A. Problem Solving Strategies

1. Inductive/Deductive reasoning

- 2. Number patterns
- 3. Solving mathematical puzzles

**B. Sets**

- 1. Basic concepts
- 2. Sets of numbers
- 3. Venn diagrams
- 4. Operations on sets
- 5. Infinity

**C. Logic**

- 1. Statements and quantifiers
- 2. Truth tables
- 3. Analyzing arguments

**D. Geometry**

- 1. Basic terms and concepts
- 2. Angles
- 3. Polygons
- 4. Perimeter, area
- 5. Polyhedrons, volume, surface area
- 6. Transformations
- 7. Non-Euclidean geometry
- 8. Topology

**E. Numeration**

- 1. Roman numerals
- 2. Binary numbers
- 3. Other number systems

**F. Number Theory**

- 1. Divisibility rules
- 2. Factors
- 3. Prime numbers
- 4. Prime factorization
- 5. Goldbach's Conjecture
- 6. Fermat's Last Theorem
- 7. Diophantine equations

**(N) Brief Course Outline**

*(Give sufficient detail to communicate the content to faculty across campus.*

*It is not necessary to include specific*

***As outlined by the federal definition of a "credit hour", the following should be a consideration***

***regarding student work - For every one hour of classroom or direct faculty instruction,***

***there should be a minimum of two hours of out of class student work.***

***readings, calendar or assignments)***

- A. Problem Solving Strategies
  - 1. Inductive/Deductive reasoning
  - 2. Number patterns
  - 3. Solving mathematical puzzles
- B. Sets
  - 1. Basic concepts
  - 2. Sets of numbers
  - 3. Venn diagrams
  - 4. Operations on sets
  - 5. Infinity
- C. Logic
  - 1. Statements and quantifiers
  - 2. Truth tables
  - 3. Analyzing arguments
- D. Geometry
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  - 3. Prime numbers
  - 4. Prime factorization
  - 5. Goldbach's Conjecture
  - 6. Fermat's Last Theorem
  - 7. Diophantine equations

## **Distance Education Section**

***- Complete this section only if adding Distance Education to a New or Existing Course***

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<p>If Completing this Section, Check the Box to the Right:</p>	<p><b>NOTE: you must check this box if the Course has previously been approved for Distance Education</b></p>
<p>Course Prefix/Number</p>	
<p>Course Title</p>	
<p>Type of Proposal</p>	<p><b>See CBA, Art. 42.D.1 for Definition</b></p>
<p>Brief Course Outline</p>	<p><b>Give an outline of sufficient detail to communicate the course content to faculty across campus. It is not necessary to include specific readings, calendar or assignments</b></p> <p><b>As outlined by the federal definition of a "credit hour", the following should be a consideration regarding student work - For every one hour of classroom or</b></p> <p><b>direct faculty instruction, there should be a minimum of two hours of out of class student work.</b></p>
<p><b>Rationale for Proposal (Required Questions from CBA)</b></p>	
<p>How is/are the instructor(s) qualified in the Distance Education delivery method as well as the discipline?</p>	
<p>For each outcome in the course, describe how the outcome will be achieved using Distance Education technologies.</p>	
<p>How will the instructor-student and student-student interaction take place? (if applicable)</p>	
<p>How will student achievement be evaluated?</p>	
<p>How will academic honesty for tests and assignments be addressed?</p>	

**Liberal Studies Section**

**- Complete this section only for a new Liberal Studies course or Liberal Studies course revision**

If Completing this Section,  
Check the Box to the Right:

**NOTE: you must check this box if the Course/Program has previously been approved for Liberal Studies**

**Liberal Studies Course Designations (Check all that apply)**

Learning Skills: mathematics

Knowledge Area:

Liberal Studies Elective

**Please mark the designation(s) that apply - must meet at least one**

Expected Undergraduate Student  
Learning Outcomes  
(EUSLOs)  
  
Map the Course Outcome to the  
EUSLO's

**Map each course outcome to the appropriate EUSLOs that apply. Fill in the course outcome number**

**See <https://www.iup.edu/liberal/faculty-and-staff/euslos/> for additional information regarding mapping EUSLOs**

Informed Learners demonstrate:	Course SLO #
<ul style="list-style-type: none"> <li>the ways of modeling the natural, social and technical worlds</li> </ul>	2
<ul style="list-style-type: none"> <li>The aesthetic facets of human experience</li> </ul>	
<ul style="list-style-type: none"> <li>the past and present from historical, philosophical and social perspectives</li> </ul>	
<ul style="list-style-type: none"> <li>the human imagination, expression and traditions of many cultures</li> </ul>	
<ul style="list-style-type: none"> <li>the interrelationships within and across cultures &amp; global communities</li> </ul>	
<ul style="list-style-type: none"> <li>the interrelationships within and across disciplines</li> </ul>	3

Empowered Learners demonstrate:	Course SLO #
<ul style="list-style-type: none"> <li>effective oral and written communication abilities</li> </ul>	3
<ul style="list-style-type: none"> <li>ease with textual, visual and electronically-mediated literacies</li> </ul>	
<ul style="list-style-type: none"> <li>problem solving skills using a variety of methods and tools</li> </ul>	2
<ul style="list-style-type: none"> <li>information literacy skills including the ability to access, evaluate, interpret and use information from a variety of sources</li> </ul>	
<ul style="list-style-type: none"> <li>the ability to transform information into knowledge and knowledge into judgement and action</li> </ul>	
<ul style="list-style-type: none"> <li>the ability to work within complex systems and with diverse groups</li> </ul>	
<ul style="list-style-type: none"> <li>critical thinking skills including analysis, application and evaluation</li> </ul>	1
<ul style="list-style-type: none"> <li>reflective thinking and the ability to synthesize information and ideas</li> </ul>	
Responsible Learners demonstrate:	Course SLO #
<ul style="list-style-type: none"> <li>intellectual honesty</li> </ul>	
<ul style="list-style-type: none"> <li>concern for social justice</li> </ul>	

	<ul style="list-style-type: none"> <li>civic engagement</li> </ul>	
	<ul style="list-style-type: none"> <li>an understanding of the ethical and behavioral consequences of decisions and actions on themselves, on society, and on the physical world</li> </ul>	
	<ul style="list-style-type: none"> <li>an understanding of themselves and a respect for the identities, histories and cultures of others</li> </ul>	

How will each outcome be measured  
 (note should mirror (L) Student Learning Outcomes\* (SLO) from the course proposal

***Narrative on how the course will address the Selected Category Content***

Course SLO #	Assessment Tool to be used to measure the outcome
1	An in-class written assessment (e. g., exam or quiz) and/or an out-of-class assignment (homework, project, writing assignment) will assess the student's ability to use mathematics, inductive and deductive reasoning, and logic to solve problems.
2	An in-class written assessment (e. g., exam or quiz) and/or an out-of-class assignment (homework, project, writing assignment) will assess the student's ability to apply mathematical techniques to solve problems.
3	An in-class written assessment (e. g., exam or quiz) and/or an out-of-class assignment (homework, project, writing assignment) will assess the student's ability to use connections between mathematics and other disciplines to communicate ideas.

All Liberal Studies courses are required to include perspectives on cultures and have a supplemental reading.

Please answer the following questions.

<p>Liberal Studies courses must include the perspectives and contributions of ethnic and racial minorities and of women whenever appropriate to the subject matter. Please explain how this course will meet this criterion.</p>	<p>Whenever appropriate, instructors will introduce into the classroom discussion the contributions in mathematics by women and minorities. These may include Sophie Germain's Theorem, which was used to prove Fermat's Last Theorem for prime numbers less than 1700, or Marjorie Lee Browne's contribution to set theory and logic in her book "Sets, Logic, and Mathematical Thought" (1957). Also, instructors will be sensitive to gender and ethnic balancing with respect to language in problem construction on homework, quizzes, and tests. The construction of contextual problems will be used to facilitate learning by making the material culturally relevant.</p>
<p>Liberal Studies courses require the reading and use by students of at least one non-textbook work of fiction or non-fiction or a collection of related articles. Please describe how your course will meet this criterion.</p>	<p>The required reading will be selected articles from "The Colossal Book of Mathematics: Classic Puzzles, Paradoxes, and Problems" by Martin Gardner (2001) and/or another appropriate reading that promotes discussion of the role of Mathematics in a well-rounded Liberal Studies education, such as "The Liberal Art of Mathematics" by Priscilla Bremser in the blog of the American Mathematical Society, December 2014.</p>

## Teacher Education Section

*- Complete this section only for a new Teacher Education course or Teacher Education course revision*

<p>If Completing this Section, Check the Box to the Right:</p>	<p><b>NOTE: you must check this box if the Course/Program has previously been approved for Teacher Education related items</b></p>				
<p>Course Designations:</p>					
<p>Key Assessments</p>					
	<p>For both new and revised courses, please attach (see the program education coordinator):</p> <ul style="list-style-type: none"> <li>• The Overall Program Assessment Matrix</li> <li>• The Key Assessment Guidelines</li> <li>• The Key Assessment Rubric</li> </ul> <table border="1" data-bbox="805 1339 1458 1717"> <thead> <tr> <th data-bbox="805 1339 1295 1381">File</th> <th data-bbox="1295 1339 1458 1381">Modified ▲</th> </tr> </thead> <tbody> <tr> <td colspan="2" data-bbox="805 1402 1458 1717" style="text-align: center;"> <p>No files shared here yet.</p> <p>Drag and drop to upload or</p> <p><a href="#">browse for files</a></p> </td> </tr> </tbody> </table>	File	Modified ▲	<p>No files shared here yet.</p> <p>Drag and drop to upload or</p> <p><a href="#">browse for files</a></p>	
File	Modified ▲				
<p>No files shared here yet.</p> <p>Drag and drop to upload or</p> <p><a href="#">browse for files</a></p>					
<p>Narrative Description of the Required Content</p>	<p><b><i>How the proposal relates to the Education Major</i></b></p>				