MATH 115 Applied Mathematics for Business-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**

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Proposing Department/Unit*	Mathematics	**Contact Phone***	7-2608

Course Level*	undergraduate-level

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)

(A) Why is the course being revised/deleted:*	We are revising MATH 115 to align the course with IUP's Expected Student Learning Outcomes and to improve our assessment of this course.
(B) University Senate Summary of Rationale*	***Please enter a single paragraph summary/rationale of changes or proposal for University Senate.*** We are revising MATH 115 to align the course with IUP's Expected Student Learning Outcomes and to improve our assessment of this course.
(C) Implications of the change on the program, other programs and the Students:*	none

Current Course Information*	
Category A	
(D) Current Prefix*	MATH
Proposed Prefix	
(E) Current Number*	115
Proposed Number	
(F) Current Course Title*	Applied Mathematics for Business
Proposed Course Title	
(G) Prerequisite(s)	MATH 105 or MATH 110 or appropriate placement test score or permission of the Mathematics Department chairperson. Note: May not be taken after successfully completing a calculus course without written Mathematics Department chairperson approval.
Proposed Prerequisite(s)	
(H) Current Catalog Description	A review of elementary functions, including logarithmic and exponential functions. Business majors are introduced to the central ideas of calculus (limit, derivative, and integral). Applications to business and economics are emphasized.
Proposed Catalog Description	
If changing Category A, no further action required.	
Category B (if no change, leave blank)	
(I)Repeatable Course ***This is for a course that can be repeated*** ***Multiple times e.g. Internship***	If YES, please complete the following: Number of Credits that May be Repeated: Maximum Number of Credits Allowed to be Repeated:
Proposed Repeatable Course	If YES, please complete the following: Number of Credits that May be Repeated: Maximum Number of Credits Allowed to be Repeated:

<table>
<tr><td>(J) Number of Credits</td><td>Class Hours per week: 3
Lab Hours: 0
Credits: 3</td></tr>
<tr><td>Proposed Number of Credits</td><td>Class Hours:Lab Hours:Credits:</td></tr>
<tr><td>(K) Current Course Student Learning Outcomes (SLOs)</td><td>1. Identify and utilize patterns in the study of mathematics.
2. Apply functions to solve problems in business and economics.
3. Interpret functions expressed analytically and graphically.
4. Relate the limit process to functions in business and economics.
5. Calculate the derivative of a function and interpret its meaning.
6. Calculate the integral of a function and interpret its meaning.</td></tr>
<tr><td>(L) Proposed Course Student Learning Outcomes (SLOs)
For each outcome, describe how
the outcome will be achieved</td><td>Note that the text box in the table expands
<table>
<tr><th>SLO #</th><th>Outcome</th><th>How outcome is assessed</th></tr>
<tr><td>1</td><td>Calculate limits of functions using data charts, graphs, and/or basic limit laws, and apply limits to define and solve problems involving continuity, differentiation, and/or integration.</td><td>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 understanding of limits and their applications.</td></tr>
<tr><td>2</td><td>Calculate derivatives of functions using the definition of the derivative and various differentiation rules, interpret the meaning of derivatives within the context of business related applications and geometric problems, use the derivative to optimize functions for graphical and physical applications, and/or solve problems involving related rates.</td><td>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 understanding of derivatives and their applications.</td></tr>
</table>
</td></tr>
</table>

3	Determine general antiderivatives of functions using basic techniques, apply the Fundamental Theorem of Calculus to evaluate definite integrals, use definite integrals to measure area and/or total accumulation of a function, and/or apply the concept of the definite integral in business related applications.	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 understanding of integration and it's applications.
4	Determine and construct appropriate mathematical models to solve applied problems in business and economics using either differential or integral Calculus, and determine an appropriate use of technology to solve 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 model and interpret solutions to real world problems using Calculus.

(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. Library of Functions 1. Functions 2. Linear Functions 3. Quadratic Functions 4. Polynomial Functions 5. Exponential Functions 6. Logarithmic Functions B. The Derivative 1. Rates of Change 2. The Limit of a Function 3. The Derivative 4. Power Rules and Summation Rules 5. Product and Quotient Rules 6. Chain Rule: Power Form 7. Marginal Analysis C. Graphing and Optimization 1. Continuity and Graphs 2. First Derivative and Graphs 3. Second Derivative and Graphs 4. Optimization D. Additional Topics in Differentiation 1. The Constant e and Continuous Compounding 2. Derivatives of Exponential and Logarithmic Functions 3. Chain Rule: General Form 4. Elasticity of Demand E. The Integral 1. Antiderivatives and Indefinite Integrals 2. Introduction to the Definite Integral 3. The Fundamental Theorem of Calculus 4. Applications of the Integral to Business and Economics

(N) Brief Course Outline ***(Give sufficient detail to communicate the*** ***content to faculty across campus.*** ***It is not necessary to include specific*** ***readings, calendar or assignments)***	***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. Library of Functions 1. Functions 2. Linear Functions 3. Quadratic Functions 4. Polynomial Functions 5. Exponential Functions 6. Logarithmic Functions B. The Derivative 1. Rates of Change 2. The Limit of a Function 3. The Derivative 4. Power Rules and Summation Rules 5. Product and Quotient Rules 6. Chain Rule: Power Form 7. Marginal Analysis C. Graphing and Optimization 1. Continuity and Graphs 2. First Derivative and Graphs 3. Second Derivative and Graphs 4. Optimization D. Additional Topics in Differentiation 1. The Constant e and Continuous Compounding 2. Derivatives of Exponential and Logarithmic Functions 3. Chain Rule: General Form 4. Elasticity of Demand E. The Integral 1. Antiderivatives and Indefinite Integrals 2. Introduction to the Definite Integral 3. The Fundamental Theorem of Calculus 4. Applications of the Integral to Business and Economics

Distance Education Section

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

If Completing this Section, **Check the Box to the Right:**	***NOTE: you must check this box if the Course has previously been approved for Distance Education***
Course Prefix/Number	
Course Title	
Type of Proposal	***See CBA, Art. 42.D.1 for Definition***
Brief Course Outline	***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*** ***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.***
Rationale for Proposal (Required Questions from CBA)	
How is/are the instructor(s) qualified **in the Distance Education delivery** **method as well as the discipline?**	
For each outcome in the course, describe **how the outcome will be achieved using** **Distance Education technologies.**	
How will the instructor-student and **student-student interaction take place?** **(if applicable)**	
How will student achievement be evaluated?	
How will academic honesty for tests **and assignments be addressed?**	

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

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*** quantitative_reasoning
Expected Undergraduate Student Learning Outcomes (EUSLOs) **Map the Course Outcome to the EUSLO's**	***Map each course outcome to the appropriate EUSLOs tha 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 #**
• the ways of modeling the natural, social and technical worlds	4
• The aesthetic facets of human experience	
• the past and present from historical, philosophical and social perspectives	
• the human imagination, expression and traditions of many cultures	
• the interrelationships within and across cultures & global communiites	

• the interrelationships within and across disciplines	4
Empowered Learners demonstrate:	**Course SLO #**
• effective oral and written communication abilities	
• ease with textual, visual and electronically-mediated literacies	
• problem solving skills using a variety of methods and tools	1,2,3,4
• information literacy skills including the ablity to access, evaluate, interpret and use informatoin from a variety of sources	
• the ablity to transform information into knowledge and knowledge into judgement and action	
• the ability to work within complex systems and with diverse groups	
• critical thinking skills including analysis, application and evaluation	1,2,3,4
• reflective thinking and the ability to synthesize information and ideas	
Responsible Learners demonstrate:	**Course SLO #**

• intellectual honesty	
• concern for social justice	
• civic engagement	
• an understanding of the ethical and behavioral consequences of decisions and actions on themselves, on society, and on the physical world	
• an understanding of themselves and a respect for the identities, histories and cultures of others	

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 understanding of limits and their applications.
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 understanding of derivatives and their applications.
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 understanding of integration and it's applications.
4	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 model and interpret solutions to real world problems using Calculus.

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

Please answer the following questions.

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.

Whenever appropriate, information will be introduced into the classroom discussion which will reflect the contributions made to the development of the mathematics involved by women and minorities. For instance, Maria Gaetana Agnesi's work interpreting differential and integral calculus in her book "Analytic Institutions" (1748). These discussions, for instance, can be based on content from the supplemental readings. 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.

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.	This course may use supplementary readings concerning some of the great mathematicians and their contributions to the calculus, as well as other areas of mathematics. For instance, "God Created the Integers: The Mathematical Breakthroughs That Changed History" by Stephen Hawking (2007). Instructors may also assign readings from the following: Dudley, U., Readings for Calculus, MAA Notes Volume 31, The Mathematical Association of America, 1993. Becker, J. R. Research on gender in mathematics: One feminist Perspective. Focus on Learning Problems in Mathematics, 18:19-25, 1996. Belenky, M. R., Clinchy, B. M., Goldberger, N. R., & Tarule, J. M. Women's ways of knowing. New York: Basic Books, 1986. Chacon, P, & Soto-Johnson, H. Encouraging young women to stay in the mathematics pipeline: Mathematics camps for young women. School Science and Mathematics, 103: 274-284, 2003. Riddle, L. "Biographies of Women Mathematicians." Agnes Scott College, n.d. Web. 23 Apr. 2013.

Teacher Education Section

- Complete this section only for a new Teacher Education course or Teacher Education 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 Teacher Education related items***
Course Designations:	
Key Assessments	
	For both new and revised courses, please attach (see the program education coordinator): • The Overall Program Assessment Matrix • The Key Assessment Guidelines • The Key Assessment Rubric **File** **Modified** No files shared here yet. Drag and drop to upload or browse for files
Narrative Description of the Required Content	***How the proposal relates to the Education Major***