

LSC Use Only No: 07-23 LSC Action-Date: AP-10/18/07 UWUCC USE Only No. App-10/23/07 UWUCC Action-Date: App-11-6-07 Senate Action Date:

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person Gary S. Stoudt	Email Address gsstoudt@iup.edu
Proposing Department/Unit Mathematics Department	Phone 7-2608

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)
 New Course Course Prefix Change Course Deletion
 Course Revision Course Number and/or Title Change Catalog Description Change

MATH 115 Applied Mathematics for Business

Current Course prefix, number and full title *Proposed course prefix, number and full title, if changing*

2. Additional Course Designations: check if appropriate
 This course is also proposed as a Liberal Studies Course. Other: (e.g., Women's Studies, Pan-African)
 This course is also proposed as an Honors College Course.

3. Program Proposals Catalog Description Change Program Revision
 New Degree Program Program Title Change Other
 New Minor Program New Track

Current program name *Proposed program name, if changing*

4. Approvals		Date
Department Curriculum Committee Chair(s)	<i>John J. Patterson</i>	8/28/07
Department Chair(s)	<i>Gary Stoudt</i>	8-28-07
College Curriculum Committee Chair	<i>[Signature]</i>	10/06/07
College Dean	<i>Angela Burch</i>	10/11/07
Director of Liberal Studies *	<i>Theresa Sellen</i>	10/19/07
Director of Honors College *		
Provost *	<i>[Signature]</i>	10/25/07
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	<i>Gail Sedquist</i>	10/23/07



Received
* where applicable
OCT 15 2007

Part II. Description of Curriculum Change

1. New Syllabus of Record

I. Catalog Description

MATH 115 Applied Mathematics for Business

3c-0f-3cr

Prerequisites: MATH 105 or MATH 110 or appropriate placement test score or permission of the Mathematics department chairperson.

Note: A student may not take this course after successfully completing a calculus course without the written approval of the Mathematics Department chairperson.

Offers a review of elementary functions including logarithmic and exponential functions. Business majors are introduced to the central ideas of the calculus (limit, derivative, and integral). Applications to business and economics are emphasized.

II. Course Outcomes

Upon completion of this course, students will be able to

1. demonstrate and take advantage of pattern recognition in the study of mathematics.
2. demonstrate the concept of function and its application to business and economics.
3. interpret functions expressed analytically and graphically.
4. demonstrate the limit process and relate it 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.
7. apply a solid set of skills and a conceptual framework to the future study of business and economics.

III. Detailed Course Outline

A. Library of Functions

(8 hours)

1. Functions
2. Linear Functions
3. Quadratic Functions
4. Polynomial Functions
5. Exponential Functions
6. Logarithmic Functions

B. The Derivative

(10 hours)

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	(7 hours)
1. Continuity and Graphs	
2. First Derivative and Graphs	
3. Second Derivative and Graphs	
4. Optimization	
D. Additional Topics in Differentiation	(6 hours)
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	(7 hours)
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	
Additional class time for three tests and a review for the final.	(4 hours)
Final Exam	(2 hours)
	Total: 42 hours
	+ 2 final exam

IV. Evaluation Methods

The final grade for the course will be determined as follows:

- 50% Tests. Tests will include problems on basic competency and critical thinking.
- 20% Final Examination. The final examination will be comprehensive and cover both basic competency and critical thinking.
- 30% Homework, Quizzes, and Projects. These will cover textbook assignments and applications to business and economics.

V. Example Grading Scale

90% - 100%	A
80% - 89%	B
70%-79%	C
60% - 69%	D
Below 60%	F

VI. Undergraduate Attendance Policy

Although there is no formal attendance policy for this class, student learning is enhanced by regular attendance and participation in class discussions.

[Note: It is recommended that an attendance policy be developed by individual faculty and included in student syllabi. (See undergraduate catalog for Undergraduate Course Attendance Policy.)]

VII. Required Textbook

Berresford, G. and A. Rockett, *Brief Applied Calculus*, 3rd Edition, Boston: Houghton Mifflin, 2004.

VIII. Special Resource Requirements

Graphing calculator

IX. Bibliography

Committee on the Mathematical Sciences in the Year 2000. Everybody Counts: A Report to the Nation on the Future of Mathematics Education. Washington, DC : National Academy Press, 1989.

Connally, Eric, Deborah Hughes-Hallett, Andrew M. Gleason, et al. Functions Modeling Change: A Preparation for Calculus. New York: John Wiley & Sons, Inc., 2003.

Haeussler, Ernest, and Richard Paul. Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences. Upper Saddle River, NJ: Prentice-Hall, Inc., 1999.

Hughes-Hallett, Deborah, et al. Applied Calculus. New York: John Wiley & Sons, Inc., 1999.

Thompson, Richard B., Christopher G. Lamoureaux, and Pamela C. Slaten. Mathematics for Business Decisions With Interdisciplinary Multimedia Projects. Washington, DC. Mathematical Association of America, 2005.

2. Summary of Proposed Revisions

We are changing the prerequisite and course description and removing some content from the course. The old prerequisite is “MATH 105 or appropriate placement test score or permission of the Mathematics Department chairperson.” We are changing this to “MATH 105, MATH 110 or appropriate placement test score or permission of the Mathematics Department chairperson.” “Mathematics of finance” is eliminated from the description since that is some of the content eliminated from the course.

3. Justification for the Revision

We have found that enough students take MATH 110 instead of MATH 105 to justify its inclusion as an option in the prerequisites.

After discussion with the Eberly College of Business and Information Technology, we have concluded that we can meet the goals for the course with a three credit course, and this would also help ease the 120 credit and accreditation burden on programs in the college. The following changes in content are being proposed.

Topic	Time change	Comments
Functions	- 2 hours	Reduce the amount of review time from MATH 105
Derivative	-1 hour	Reduce review time of rates of change from MATH 105
Graphing/Optimization	-1 hour	Rely more heavily on graphing calculator-less hand graphing, more interpretation.
Topics in Differentiation	+1 hour	More applications
Integral	-1 hour	Reduce time reviewing derivatives for antiderivatives
Mathematics of Finance	- 6 hours	Eliminated; will be picked up in FIN 310 Fundamentals of Finance
Tests	-1 hour	Reduce from 4 tests to 3
Review	-3 hours	Eliminate the review before each test
Total	- 14 hours	

We will accommodate the change to a 50 minute “hour” like everyone else, with a combination of less review time and less time for homework questions inside class.

Because there will be fewer hours devoted to review, students will need to be better prepared to succeed in this course. The MATH 105 and placement prerequisite will become all the more important.

4. Old Syllabus of Record

Next page

I. Catalog Description

MATH 115 Applied Mathematics for Business

4 credits
4 lecture hours
(4c-0l-4sh)

Prerequisites: MATH 105 or equivalent high school preparation.

Note: A student may not take MATH 115 after successfully completing a calculus course without the written approval of the mathematics department chairperson.

After a review of elementary functions (including logarithmic and exponential functions), introduces business majors to mathematics of finance and central ideas of the calculus (limit, derivative, and integral). Emphasis on applications to business and economics.

II. Course Objectives

1. Students will understand and take advantage of pattern recognition in the study of mathematics.
2. Students will make a careful study of functions and their application to business and economics.
3. Students will make a careful study of the mathematics of finance.
4. Students will understand how to interpret functions expressed analytically and graphically.
5. Students will understand the limit process and how it pertains to functions in business and economics.
6. Students will be able to calculate the derivative of a function and interpret its meaning.
7. Students will be able to calculate the integral of a function and interpret its meaning.
8. Students will leave the course with a solid set of skills and a conceptual framework to equip the students for the future study of business and economics.

III. Course Outline

A. Library of Functions (10 hours)

1. Functions
2. Linear Functions
3. Quadratic Functions
4. Polynomial Functions
5. Rational Functions
6. Exponential Functions
7. Logarithmic Functions

- B. Mathematics of Finance (6 hours)
 - 1. Simple Interest
 - 2. Compound Interest
 - 3. Future Value of an Annuity
 - 4. Present Value of an Annuity

- C. The Derivative (11 hours)
 - 1. Rates of Change
 - 2. Limits
 - 3. The Derivative
 - 4. Power Rules and Summation Rules
 - 5. Product and Quotient Rule
 - 6. Chain Rule: Power Form
 - 7. Marginal Analysis in Business and Economics

- D. Graphing and Optimization (8 hours)
 - 1. Continuity and Graphs
 - 2. First Derivative and Graphs
 - 3. Second Derivative and Graphs
 - 4. Other Curve Sketching Techniques
 - 5. Optimization: Absolute Maxima and Minima

- E. Additional Topics in Differentiation (5 hours)
 - 1. The Constant e and Continuous Compound Interest
 - 2. Derivatives of Exponential and Logarithmic Functions
 - 3. Chain Rule: General Form

- F. Integration (8 hours)
 - 1. Antiderivatives and Indefinite Integrals
 - 2. Integration by Substitution
 - 3. Introduction to the Definite Integral
 - 4. The Fundamental Theorem of Calculus
 - 5. Applications of the Integral to Business and Economics

The remaining eight hours are for four review classes and four tests.

IV. Evaluation Methods

The final grade for the course will be determined as follows:

- 50% Tests. Tests will include problems on basic competency and critical thinking.
- 20% Final Examination. The final examination will be comprehensive and cover both basic competency and critical thinking.
- 30% Homework, Quizzes, and Projects. These will cover textbook assignments and applications to business and economics.

V. Required Textbook

Barnett, Raymond, Michael Ziegler, and Karl Byleen. Applied Mathematics for Business, Economics, Life Sciences, and Social Sciences. Upper Saddle River, NJ: Prentice-Hall, Inc., 2000.

VI. Special Resource Requirements

Some instructors may require students to purchase a graphing calculator.

VII. Bibliography

Committee on the Mathematical Sciences in the Year 2000. Everybody Counts: A Report to the Nation on the Future of Mathematics Education. Washington, DC : National Academy Press, 1989.

Haeussler, Ernest, and Richard Paul. Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences. Upper Saddle River, NJ: Prentice-Hall, Inc., 1999.

Hughes-Hallet, Deborah, et al. Applied Calculus. New York: John Wiley & Sons, Inc., 1999.

LIBERAL STUDIES COURSE APPROVAL, PARTS 1-3: GENERAL INFORMATION CHECK-LIST

I. Please indicate the LS category(ies) for which you are applying:

LEARNING SKILLS:

- First Composition Course Second Composition Course
 Mathematics

KNOWLEDGE AREAS:

- Humanities: History Fine Arts
 Humanities: Philos/Rel Studies Social Sciences
 Humanities: Literature Non-Western Cultures
 Natural Sci: Laboratory Health & Wellness
 Natural Sci: Non-laboratory Liberal Studies Elective

no longer requesting this category

II. Please use check marks to indicate which LS goals are primary, secondary, incidental, or not applicable. When you meet with the LSC to discuss the course, you may be asked to explain how these will be achieved.

Prim	Sec	Incid	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A. Intellectual Skills and Modes of Thinking:

1. Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process.
2. Literacy--writing, reading, speaking, listening.
3. Understanding numerical data.
4. Historical consciousness.
5. Scientific Inquiry.
6. Values (Ethical mode of thinking or application of ethical perception).
7. Aesthetic mode of thinking.

B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person

C. Understanding the Physical Nature of Human Beings

D. Collateral Skills:

1. Use of the library.
2. Use of computing technology.

III. The LS criteria indicate six ways that courses should contribute to students' abilities. Please check all that apply. When you meet with the LSC, you may be asked to explain your check marks.

1. Confront the major ethical issues which pertain to the subject matter; realize that although "suspended judgment" is a necessity of intellectual inquiry, one cannot live forever in suspension; and make ethical choices and take responsibility for them.
2. Define and analyze problems, frame questions, evaluate available solutions and make choices.
3. Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking.
4. Recognize creativity and engage in creative thinking.
5. Continue learning even after the completion of their formal education.
6. Recognize relationships between what is being studied and current issues, thoughts, institutions, and/or events.

A. Intellectual Skills and Modes of Thinking:

1. Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process.

The study of mathematics requires the student to use these categories to collect data (the given, known quantities), clearly state the problem under study, apply the methods known to arrive at a solution to the problem, and analyze and interpret the solution in the context of the problem.

2. Literacy--writing, reading, speaking, listening.

All of these can be applied and improved in this course. Reading skills are necessary for a clear understanding of the material; the writing of solutions to a mathematical problem requires clarity of mind and organization of thought; the requirement of discussing mathematics in the classroom shows the student the importance of clear patterns of thinking and of the importance of the expression of those thoughts orally; listening skills are very important in the understanding of mathematics. These skills will be improved through the writing on homework and tests, through the oral response to classroom questions, and through the reading of assignments.

3. Understanding numerical data.

No data is meaningful without interpretation and the study of mathematics attempts to train the student in the methods and skills needed to interpret data correctly.

4. Scientific Inquiry.

Students will be made aware of the importance of mathematical logic and the role it plays in scientific inquiry and problem solving techniques used through out science. Students will be made aware that mathematics is the language of science and discovery.

6. Aesthetic mode of thinking.

Mathematics is a beautiful art form. An effort will be made to develop in the student a sense of this beauty and an appreciation for its power at utility.

B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person

Although mastery of a specific area of mathematics is not required of all students, it is important that all students develop a sense of the importance of mathematics to society. In addition, the course of study should develop in the students a feeling of confidence in their ability to use the mathematical skills learned in their particular mathematics course.

D. Collateral Skills:

2. Use of computing technology.

Students will make use of hand-held programmable, analytic, symbolic, and graphing technology. This is an essential element of the course. Students will look at functions and the ideas of calculus through analytical and graphical tools.

LIBERAL STUDIES COURSE APPROVAL, PARTS 4-6:

This will be a multiple-section course. There is a basic equivalency among the sections. There will be a common syllabus that should be covered by each of the instructors. Calculus instructors typically meet at the end of each year to discuss the textbook for the following year. Throughout the semester instructors typically meet to compare their pace in the course, check what students are finding difficult, and compare tests. The calculus sequence is governed by the Mathematics Department Service Courses Curriculum Committee.

Whenever appropriate, information will be introduced into the classroom discussion which will reflect the contributions made to the development of the calculus by women and minorities. Also, instructors will be sensitive to gender and ethnic balancing with respect to language in problem construction on homework, quizzes, and tests.

In this course we would like to exercise the exception to the use of a work of fiction or non-fiction. In this course we are concentrating on developing the foundation of calculus; we will work on quantitative skills.

This course is an introductory course, but for a specific audience: business students. It does indeed differ from what is provided to beginning mathematics majors. Calculus is a core discipline in business, and there are similar ideas of interest in both mathematics and business, one important example being optimization. However, business majors do not require the depth of knowledge of the theory of calculus that would be expected of mathematics majors. Also, business majors do not require the same amount of techniques necessary to solve problems. Business students do get an appreciation for mathematics as the language of decision making with data. This course provides methods by which one can construct an accurate, reliable, consistent and non-arbitrary representation of the business world. Mathematics is a tool to write, analyze, and convey these representations.

CHECK LIST -- MATHEMATICS

(Learning Skills Area)

Mathematics Criteria which the Course must meet:

- Introduce students to deductive reasoning
- Develop in the student problem solving techniques appropriate for the course
- Enable the student to understand the underlying principle of formulas
- Enable the student to use and interpret numerical information

Courses appropriate to the Mathematics Learning Skills Area must be either:

- A.** Mathematics courses that develop significant mathematical skills required by a major discipline
- B.** Mathematics courses designed for Liberal Studies

Additional criteria which courses in Category B must meet:

- Develop the student's confidence in handling numerical problems and data.
- Be sensitive to the diverse background characteristics of the student
- Include elements on the history or appreciation of mathematics
- Introduce the hand-held calculator or the computer as a tool

Part III. Letters of Support or Acknowledgement

-----Original Message-----

From: Robert Camp [<mailto:bobcamp@iup.edu>]
Sent: Friday 29 June 2007 3:10 PM
To: Gary.Stoudt@iup.edu
Subject: RE: MATH 115 Chairpersons Meeting

Hi Gary-

I apologize for not responding more quickly. The Eberly College chairpersons did review your proposal for a revision to Math 115. They and I fully support your proposal. Thank you for your service to our students.

Bob Camp

-----Original Message-----

From: Gary Stoudt [<mailto:Gary.Stoudt@iup.edu>]
Sent: Wednesday, June 13, 2007 10:38 AM
To: 'Robert Camp'
Subject: MATH 115 Chairpersons Meeting

Whenever you have some time in your chairperson's meeting agenda, I'd be happy to come over to talk about MATH 115. Except for freshmen registration (which I do at the same time as your chairs) I am free.

Gary

Gary Stoudt
Mathematics Department

-----Original Message-----

From: Robert Camp [<mailto:bobcamp@iup.edu>]
Sent: Monday 1 October 2007 3:09 PM
To: Gary.Stoudt@iup.edu
Subject: RE: MATH 115 revisions

Gary,

It is covered in Finance 310 (Fundamentals of Finance) which is required of department business majors.

Thanks,
Bob Camp

-----Original Message-----

From: Gary Stoudt [<mailto:Gary.Stoudt@iup.edu>]
Sent: Thursday, September 27, 2007 2:24 PM
To: 'Robert Camp'
Subject: MATH 115 revisions

Bob,

I am working MATH 115 through the curriculum process and an item has come up. I have your letter of support, but now we need assurance that the missing content will be absorbed elsewhere in your curriculum. The sticking point is the elimination of the mathematics of finance. In the course revision document we state that this material will be picked up in various business major courses.

Can you or one of your chairpersons send me an email I can include that mentions the course(s) where this mathematics of finance material appears? I am sure it is somewhere, but I do not know your courses well enough to know where.

Thanks.

Gary

Gary Stoudt
Mathematics Department

Ola Kaniasty

From: "Jerry Buriok" <jburiok@iup.edu>
To: "Amy R. Cook" <AMYCOOK@iup.edu>; "Buriok, Gerald M" <Gerald.Buriok@iup.edu>; "Ola Kaniasty" <AKANIAST@iup.edu>
Cc: "Jerry Buriok" <jburiok@iup.edu>
Sent: Tuesday 2 October 2007 4:03 PM
Subject: Re: PLEASE IDENTIFY

Biology 3512
Biology 3515
Biology 3517
Biology 3519
Mathematics 3601
Psychology 3652
Psychology 3653
Psychology 3654

Jerry

----- Original Message -----

From: "Amy R. Cook" <AMYCOOK@iup.edu>
To: "Buriok, Gerald M" <Gerald.Buriok@iup.edu>; "Ola Kaniasty" <AKANIAST@iup.edu>
Sent: Tuesday, October 02, 2007 3:54 PM
Subject: PLEASE IDENTIFY

> Good Afternoon,
>
> Can you identify which positions (highlighted in green on attachment) you
> will be holding to Asst 4 permanently?
>
>
> Amy R. Cook
> Academic Administration, Sutton 227
> Indiana University of PA
> 724-357-1332 (phone)
> 724-357-1345 (fax)
>