LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
269		06-23a	App. 2-6-07	App. 2-27-07

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Gary S. Stoudt	**gsstoudt@iup.edu**
Proposing Department/Unit	Phone
Mathematics Department	**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)

__X__ New Course _____ Course Prefix Change _____ Course Deletion

_____ Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

	MATH 125 Calculus I/Physics, Chemistry, Mathematics
***Current* Course prefix, number and full title**	***Proposed* course prefix, number and full title, if changing**

2. Additional Course Designations: check if appropriate

__X__ This course is also proposed as a Liberal Studies Course.

_____ This course is also proposed as an Honors College Course.

_____ Other: (e.g., Women's Studies, Pan-African)

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)	Frederick C. Eckhardt	10-31-06
Department Chair(s)	Gary Stoudt	10-31-06
College Curriculum Committee Chair		11/28/06
College Dean	Gerald Burns	11/28/06
Director of Liberal Studies *	Mary Seeley	12/7/06
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	Gail S Sechrist	2-06-07

Received
NOV 29 2006
Liberal Studies

* where applicable

Part II. Description of Curriculum Change

1. New Syllabus of Record

I. Catalog Description

MATH 125 Calculus I/Physics, Chemistry, Mathematics	3 class hours 0 lab hours 3 credit hours 3c-0l-3cr

Prerequisite: MATH 110 or equivalent placement (Algebra, geometry and trigonometry.)

The first of a three semester sequence for math and science majors covering the theory of calculus and its application in problem solving. Topics include: functions, limits, continuity, derivatives, applications of derivative, integrals and applications of the integral. (Trigonometric, exponential and logarithmic functions are included throughout the course.)

II. Course Outcomes

Upon completion of this course, students will be able to

1. Use graphical, numerical, analytical, and verbal representations of functions.
2. Calculate limits by graphical, numerical, and analytic methods.
3. Use the concept of derivative to express both rate of change and slope of tangent lines.
4. Express continuity and the derivative of a function in terms of limits.
5. Calculate derivatives of algebraic and transcendental functions using sum, product, quotient and chain rules.
6. Use derivatives to sketch graphs and solve applied problems.
7. Calculate definite and indefinite integrals using the fundamental theorem of calculus.
8. Express definite integrals as Riemann sums.
9. Express area and volume in terms of definite integrals.
10. Use technology appropriately as an aid to problem solving.
11. Convert written applied problems into mathematical models and solve these using methods of differential calculus.
12. Understand mathematics as part of the language of science and as a study in itself.

III. Detailed Course Outline

A. Review and Overview	
1. Functions and Models	(0.5 class)
2. Overview of Calculus	(0.5 class)
B. Limits and Derivatives	
1. The Tangent and Velocity Problems	(1 class)
2. The Limit of a Function	(1 class)
3. Calculating Limits Using the Limit Laws	(1.5 classes)
4. Continuity	(1 class)
5. Limits Involving Infinity	(1 class)
6. Tangents, Velocities, and Rates of Change	(1 class)
7. Derivatives	(0.5 class)
8. The Derivative as a Function	(1 class)
9. What Does f' Say about f?	(1 class)
C. Differentiation Rules	
1. Derivatives of Polynomials and Exponential Functions	(1 class)
2. The Product and Quotient Rules	(1 class)
3. Rates of Change in the Natural Sciences	(1 class)
4. Derivatives of Trigonometric Functions	(1 class)
5. The Chain Rule	(1.5 classes)
6. Implicit Differentiation	(1.5 classes)
7. Derivatives of Logarithmic Functions	(1 class)
8. Approximations, Differentials and Newton's Method	(1 class)
D. Applications of Differentiation	
1. Related Rates	(2 classes)
2. Maximum and Minimum Values	(1 class)
3. Derivatives and the Shapes of Curves	(1.5 classes)
4. Graphing with Calculus and Calculators	(1.5 classes)
5. Indeterminate Forms and l'Hospital's Rule	(1 class)
6. Optimization Problems	(2 classes)
7. Antiderivatives	(1 class)
E. Integrals	
1. Areas and Distances	(1 class)
2. The Definite Integral	(1 class)
3. Evaluating Definite Integrals	(1 class)
4. The Fundamental Theorem of Calculus	(1.5 classes)
5. The Substitution Rule	(1.5 classes)
F. Applications of Integration	
1. More about Areas	(1 class)
2. Volumes	(1 class)
Additional class time for review periods and examinations	(5 classes)
Total classes:	42

IV. Evaluation Methods

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

Homework	15%
Quizzes	10%
Projects	5%
3 exams	51%
Comprehensive Final	19%

The projects cover curve fitting and exponential rates of change, graph sketching with calculus, and applications where rates of change are integrated to yield quantities

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 Textbooks, Supplemental Books and Readings

Stewart, J., *Calculus: Concepts and Contexts*, Third Edition, Brooks/Cole, 2004.

Coverage: Chapters 2, 3, 4, sections 5.1 through 5.5, and 6.1. Sections 4.7 and 4.8 will be incorporated into other sections.

VIII. Special Resource Requirements

Students should have access to a calculator with graphical and symbolic capabilities.

IX. Bibliography

Anton, H., Bivens, I., and Davis, S., *Calculus: Early Transcendentals, Single and Multivariable*, 8th Edition, John Wiley & Sons, 2005.

Thomas, G., Wier, M., Hoss, J., and Giordano, F., *Thomas' Calculus Early Transcendental*, 11th Edition, Addison-Wesley, 2005.

Varberg, D., Purcell, E., and Rigdon, S., *Calculus*, 9th Edition, Prentice-Hall, 2006.

Section A: Details of the Course

A1. How does this course fit into the programs of the department? For which students is the course designed? (majors, students in other majors, liberal studies). Explain why this content cannot be incorporated into an existing course.

This course is designed for students who need a traditional calculus sequence. It will be required of students in the Biochemistry, Chemistry, Physics, and Mathematics programs and selected students in Computer Science and Geoscience programs. It will count as a Liberal Studies Learning Skills: Mathematics course or as a Liberal Studies Elective course for these students. The course content is currently included in MATH 123, but at a very rapid pace. With the change to the 50/75 minute schedule, this exacerbates the problem. The course will slow the pace of the material.

A2. Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses or department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and/or program requirements.

Since calculus is a prerequisite for many courses and is a requirement in the above mentioned programs, these courses and programs will be undergoing revision at the same time.

A3. Has this course ever been offered at IUP on a trial basis (e.g. as a special topic) If so, explain the details of the offering (semester/year and number of students).

No. This is a restructuring of the MATH 123/124 calculus sequence.

A4. Is this course to be a dual-level course? If so, please note that the graduate approval occurs after the undergraduate.

No.

A5. If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student? Who will make this determination and by what procedures?

N/A

A6. Do other higher education institutions currently offer this course? If so, please list examples (institution, course title).

Practically every higher education institution offers a calculus sequence. What follows is a selection from IUP's Peer Institutions.

Bowling Green State University

MATH 131. Calculus and Analytic Geometry (5)
Differential and integral calculus including applications. The MATH 131-232-233 sequence is a traditional calculus course for well-prepared students and is prerequisite for all advanced mathematics and statistics courses. Prerequisites: (1) two years of high school algebra, one year of geometry, one-half year of trigonometry, ACT math score of 24 or higher and satisfactory score on department placement test; or (2) grade of C or higher in MATH 128, MATH 129 or MATH 130.

MATH 232. Calculus and Analytic Geometry II (5). Fall, Spring. MATH 131 continued. Calculus of transcendental functions, techniques of integration, plane analytic geometry, sequences, and series. Prerequisite: grade of C or higher in MATH 131 or MATH 135.

MATH 233. Calculus and Analytic Geometry III (3). Fall, Spring. MATH 232 continued. Vectors and vector-valued functions, analytic geometry in space, partial derivatives, multiple integrals, applications. Prerequisite: grade of C or higher in MATH 232.

Idaho State University

MATH 170 Calculus I 4 credits. First course in the sequence 170, 175, 275. Real-valued functions of one real variable: limits, continuity, derivatives, integrals, applications. Credit cannot be granted in both MATH 160 and MATH 170. PREREQ: MATH 147 OR MATH 143/144. Satisfies Goal 3 of the General Education Requirements.

MATH 175 Calculus II 4 credits. Second course in the sequence 170, 175, 275. Techniques of integration, trigonometric integrals, improper integrals. Applications of definite integrals. First- and second-order linear differential equations with constant coefficients. Sequences and series. Parametric curves in the plane, polar coordinates. PREREQ: MATH 170.

MATH 275 Calculus III 4 credits. Third course in the sequence 170, 175, 275. Multivariable calculus. Vector algebra and geometry. Functions of several variables. Differentiation. Optimization. Multiple Integrals. Parametric curves and surfaces. Line and surface integrals. Vector fields. Green's, Stokes', and divergence theorems. PREREQ: MATH 175.

Indiana State University

Math 131 Calculus I
Conic sections, limits, continuity, differentiation, anti derivates. The definite integral, the fundamental theorem of integral calculus, and applications. Assumes an adequate background in algebra, geometry, and trigonometry. General Education Credits [GE89: A4; GE2000: Scientific and Mathematical Studies-Elective]

Math 132 Calculus II
Transcendental functions, applications, and techniques of integration, indeterminate forms, sequences, infinite series. Prerequisite: Math 131. General Education Credits [GE89: A8, when taken in sequence with Math 131]

Math 231 Calculus III
Vectors in 2- and 3-space, vector-valued functions, differentiation and integration of functions of several variables, line integrals, Green's Theorem. Prerequisite: Math 132.

A7. Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation.

Many scientific societies require a knowledge of calculus of their students. For example, the American Chemical Society in their Spring, 2003 Undergraduate Professional Education in Chemistry: Guidelines and Evaluation Procedures document, states (page 8) "Calculus is required for physical chemistry. Certified graduates should study calculus through multivariate analysis and be exposed to linear algebra and differential equations."

Section B: Interdisciplinary Implications

B1. Will this course be taught by instructors from more than one department or team taught within the department? If so, explain the teaching plan, its rationale, and how the team will adhere to the syllabus of record.

No.

B2. What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments that clarify their attitudes toward the proposed change(s).

Extensive discussions took place with the Chemistry, Computer Science, Economics, Geoscience, and Physics Departments and the Biochemistry coordinators. Their letters of support are attached and they will be revising their curricula accordingly. Biology and Psychology in the College of Natural Sciences and Mathematics were not consulted because their programs do not have MATH 123/124 as requirements. The Computer Science Department currently allows students to take either MATH 123 or MATH 121-122. They have decided that MATH 121-122 is still a good calculus sequence for their students but they will allow 125 to substitute for MATH 123. Geoscience students currently have the option of taking MATH 121-122 or MATH 123-124. MATH 121-122 will remain the required course for these students, but students will be allowed to substitute the new calculus sequence. Chemistry programs will require the new calculus sequence, as will the Economics/Mathematics program.

B3. Will this course be cross-listed with other departments? If so, please summarize the department representatives' discussions concerning the course and indicate how consistency will be maintained across departments.

No.

B4. Will seats in this course be made available to students in the School of Continuing Education?

Students in the School of Continuing Education will be able to take this course, although no seats will be specifically held for them.

Section C: Implementation

C1. Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedule(s) of current faculty. What will be taught less frequently or in fewer sections to make this possible? Please specify how preparation and equated workload will be assigned for this course.

Once this new sequence is fully implemented, faculty resources will be adequate. Under the old calculus sequence, the Mathematics Department offered three sections of 123 and one section of 124 in the Fall. In the Spring it has been two sections of 123 and two sections of 124. So, for the year it was 32 credit hours of load.

Once the transition is complete, we anticipate offering three sections of MATH 125, one section of MATH 126, and two section of MATH 225 during fall semesters; and two sections of MATH 125, two sections of MATH 126, and one section of MATH 225 during spring semesters. For the year this will be 33 credit hours of load.

During the transition year 2007-08, we must offer the new calculus sequence and the old one. Based on enrollment patterns, in the Fall we plan to offer two sections of MATH 123, one section of MATH 124, two sections of MATH 125, and one section of MATH 126. This is a load of 21 credit hours. In the spring, we plan to offer one section of MATH 123, one section of MATH 124, one section of MATH 125, one section of MATH 126, and one section of MATH 225. This is a load of 17 credit hours. For the year, this requires 38 credit hours of load, and increase of 6 credit hours. During the transition, this will require that we offer two fewer sections of liberal studies courses during the year. Considering the large number of sections we offer in a given year, this should not be too much of a burden on students. Should there be a large number of students requiring the old sequence after one year of transition, we can have a second transition year.

C2. What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following:

Other resources are adequate. They are the same resources used to teach MATH 123/124.

C3. Are any of the resources for this course funded by a grant? If so, what provisions have been made to continue support for this course once the grant has expired? (Attach letters of support from Dean, Provost, etc.)

No.

C4. How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?

This course will be offered every semester, and, based on sufficient enrollment, in the summer as well.

C5. How many sections of this course do you anticipate offering in any single semester?

Once the transition from MATH 123/124 to MATH 125/126/225 is complete, we anticipate offering three sections of MATH 125, one section of MATH 126, and two sections of MATH 225 during fall semesters; and two sections of MATH 125, two sections of MATH 126, and one section of MATH 225 during spring semesters. This is based on current enrollment patterns in MATH 123/124. We anticipate offering MATH 125 during Summer I, MATH126 during Summer II, and MATH 225 in a session based on student interest.

C6. How many students do you plan to accommodate in a section of this course? What is the justification for this planned number of students?

We plan to accommodate 38 students in a section. This is the size of the classrooms in Stright Hall.

C7. Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.

No.

C8. If this course is a distance education course, see the Implementation of Distance Education Agreement and the Undergraduate Distance Education Review Form in Appendix D and respond to the questions listed.

This course is not a distance education course.

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
__X__ Mathematics

KNOWLEDGE AREAS:

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

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		
X				**A.**	**Intellectual Skills and Modes of Thinking:**
				1.	Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process.
	X			2.	Literacy--writing, reading, speaking, listening.
X				3.	Understanding numerical data.
		X		4.	Historical consciousness.
X				5.	Scientific Inquiry.
			X	6.	Values (Ethical mode of thinking or application of ethical perception).
	X			7.	Aesthetic mode of thinking.
	X			**B.**	**Acquiring a Body of Knowledge or Understanding Essential to an Educated Person**
			X	**C.**	**Understanding the Physical Nature of Human Beings**
				D.	**Collateral Skills:**
			X	1.	Use of the library.
	X			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.

__X__ 2. Define and analyze problems, frame questions, evaluate available solutions and make choices.

__X__ 3. Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking.

__X__ 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 thought 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. Historical consciousness.

Student will become aware of the historical significance of the calculus in the development of western civilization and its importance in contemporary times. A common technique used in teaching calculus is to motivate new concepts by looking at the historical origins and problems that calculus was created to solve.

5. 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.

7. 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 student 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. Because this is the first course in a sequence, it is essential that there is basic equivalency among the sections because students could schedule a different instructor for later courses in the sequence. 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 Mathematics/Applied Mathematics 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 first calculus 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: mathematics and science students. It does not differ from what is provided to beginning mathematics majors. Calculus is a core discipline in both mathematics and science, and students in these majors benefit from a shared core course. Mathematics majors benefit by understanding the science applications inherent in the course. Calculus was developed to solve certain problems, some inherent to science, and some inherent to mathematics itself. Science students get an appreciation for mathematics as the language of science. The scientific method is the process by which scientists, collectively and over time, endeavor to construct an accurate, reliable, consistent and non-arbitrary representation of the 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:

__X__ Introduce students to deductive reasoning

__X__ Develop in the student problem solving techniques appropriate for the course

__X__ Enable the student to understand the underlying principle of formulas

__X__ Enable the student to use and interpret numerical information

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

__X__ **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

Biochemistry

To: Curriculum Committee
The University Senate
IUP

From: Dr. N Bharathan, Dr. Jonathan Southard, Co-Coordinators
Biochemistry Program
College of Natural Sciences and Mathematics
IUP

Date: October 20, 2006

Subject: Calculus Revisions

This letter is in support of the curriculum proposal submitted by the Mathematics Department describing changes in calculus courses for natural science majors. We are concurrently developing a curriculum proposal for the biochemistry B. S. that will reflect the proposed changes in calculus courses for this degree program. The proposed changes will have minimal impact on credit hour distribution in this program. The Biochemistry Program fully supports the revisions to calculus courses proposed by the Mathematics Department.

Chemistry

-----Original Message-----
From: John Woolcock [mailto:Woolcock@iup.edu]
Sent: Tuesday 14 November 2006 2:12 PM
To: Gary.Stoudt@iup.edu
Cc: Wendy Elcesser
Subject: Re: Calculus Revision support

Gary,

At the faculty meeting today (11/14/06) the Chemistry Department voted to support the revisions in the Calculus courses. However, I was also asked to tell you that a majority in the Department were concerned that adding a third calculus course would significantly impact the ability of our students to complete the Chemistry degree programs in a timely fashion. As a result the Chemistry Department Curriculum Committee will continue to work on how to revise the MATH requirements for our degree programs in response to the proposed changes in the Calculus courses.

Also at the meeting, the Chemistry Department approved a change to the MATH electives so that MATH 342 will be the course that is highly recommended as the MATH elective for the BS CHEM degree. However we also approved adding MATH 216 to the current list of MATH electives.

John Woolcock

Computer Science

-----Original Message-----
From: Bill Oblitey [mailto:oblitey@iup.edu]
Sent: Wednesday 18 October 2006 9:28 AM
To: Gary.Stoudt@iup.edu
Subject: Re: calculus Revision Support

Gary,
We had a meeting yesterday and we looked at your program revisions. the Computer Science faculty supports your revision.

Bill Oblitey

Economics

-----Original Message-----
From: Nicholas Karatjas [mailto:karatjas@iup.edu]
Sent: Wednesday 18 October 2006 11:37 AM
To: Gary.Stoudt@iup.edu
Subject: Re: Calculus Revisions Support Letter

Gary,

The Department of Economics supports the calculus revision.

Nicholas Karatjas
Chair, Department of Economics

Geoscience

November 27, 2006

To: Gary Stoudt, Mathematics Department

From: Steve Hovan, Geoscience Department

RE: proposed revision of Calculus courses

Gary,

Thank you for the succinct summary and discussion of the proposed changes in the Calculus course sequence offered by the Mathematics Department. I've discussed these courses with our faculty and we are all in favor of the changes and fully support your efforts to enhance these courses. Although Geoscience degree programs will still require the Math 121 and/or 122 sequence, I'm delighted that some of our more quantitatively focused majors (i.e. those intending to pursue graduate degrees after IUP) will be able to select the new three-course calculus sequence to fulfill the calculus requirements and I'm sure that they will benefit tremendously from these.

I am very impressed with how much thought went into the proposed changes and wish you and the department all the best in the curriculum review process.

Sincerely,

Steve Hovan

Chair, Geoscience Department

Physics

October 17, 2006
Dr. Gary Stoudt
Chairman
IUP Math Department

Gary,

On October 10, 2006 the Physics Department considered the revision that your department is planning to make in calculus sequence for physics, chemistry, and mathematics majors (the new MATH 125/126/225 – 9 credits, for the old MATH 123/124 – 8 credits). We assume that the impetus to make this change arises from the loss of class time in the new 50/70 class period schedule to be put in place in the fall semester 2007. Even so, in reality, there still will be a net loss in the total class time – new 97.5 versus old 104 class hours. The revision you have put forward is fundamentally sound and our department will support the proposed revision with certain reservations.

1) We can accommodate this change **in all but one** of our present programs by changing the number of free electives. As you know, the exception is Physics Education where there are no free electives. This will mean a loss of instruction in such areas as triple integrals and integrals using different coordinate systems among other items. However, we understand that these majors will cover

sufficient mathematical concepts in MATH 125/126 to prepare them for Differential Equations, MATH 241.

2) We understand that the Math Department will continue to offer MATH 123/124 for those students who have already begun their program where these courses are required.
3) This change will also mean a program revision in all our programs and an increase in credits expected in our pre-engineering programs where our students will have difficulty in meeting expected time-lines. This difficulty will arise because, for example, the Drexel pre-engineering major will need to take 2 math courses and 2 lab sciences in some semesters a demanding load even for our better students.

You have already agreed to item 2), and in the case of item 3) I had suggested that it might ameliorate the pre-engineers problems if MATH 225 could be offered in the summer. We have no more than a few/year that manage to transfer to Drexel and would have need of a summer course. Consequently, any summer course offering you would provide would depend on the additional needs of other programs.

If there is any further assistance the Math Department can offer our students, particularly with item 1) above, we will appreciate your help.

Sincerely,

Ken Hershman
Chairman
IUP Physics Department

From: Marcy Rearick [mailto:MREARICK@iup.edu]
Sent: Thursday 12 October 2006 11:20 AM
To: gary.stoudt@iup.edu
Subject: Fw: New Course Numbers and Titles

Gary,
MATH 125, 126, and 225 are all available numbers. Thank you for inquiring.
Marcy

>
> ----- Original Message -----
> From: "Gary Stoudt" <Gary.Stoudt@iup.edu>
> To: "registrars-office@iup.edu" <registrars-office@pubdist.iup.edu>
> Sent: Wednesday, October 11, 2006 9:54 AM
> Subject: New Course Numbers and Titles
>
>
>> The Mathematics Department is planning a revision of the two course, 8
>> credit MATH 123/124 calculus sequence into a new three course, 9 credit
>> calculus sequence. I have a few questions.
>>
>> 1. Are the numbers MATH 125, MATH 126, MATH 225 available?

>>
>> 2. Can we use titles similar to those of the old sequence?
>> MATH 125 Calculus I/Physics, Chemistry, Mathematics
>> MATH 126 Calculus II/Physics, Chemistry, Mathematics
>> MATH 225 Calculus III/Physics, Chemistry, Mathematics
>>
>> Thanks.
>>
>> Gary
>>
>> Gary Stoudt
>> Mathematics Department
>>
>

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
__X__ Mathematics

KNOWLEDGE AREAS:

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

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		
X				**A.**	**Intellectual Skills and Modes of Thinking:**
				1.	Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process.
	X			2.	Literacy--writing, reading, speaking, listening.
X				3.	Understanding numerical data.
		X		4.	Historical consciousness.
X				5.	Scientific Inquiry.
			X	6.	Values (Ethical mode of thinking or application of ethical perception).
	X			7.	Aesthetic mode of thinking.
	X			**B.**	**Acquiring a Body of Knowledge or Understanding Essential to an Educated Person**
			X	**C.**	**Understanding the Physical Nature of Human Beings**
				D.	**Collateral Skills:**
			X	1.	Use of the library.
	X			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.

__X__ 2. Define and analyze problems, frame questions, evaluate available solutions and make choices.

__X__ 3. Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking.

__X__ 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 thought 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. Historical consciousness.

Student will become aware of the historical significance of the calculus in the development of western civilization and its importance in contemporary times. A common technique used in teaching calculus is to motivate new concepts by looking at the historical origins and problems that calculus was created to solve.

5. 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.

7. 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 student 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. Because this is the first course in a sequence, it is essential that there is basic equivalency among the sections because students could schedule a different instructor for later courses in the sequence. 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 Mathematics/Applied Mathematics 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 first calculus 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: mathematics and science students. It does not differ from what is provided to beginning mathematics majors. Calculus is a core discipline in both mathematics and science, and students in these majors benefit from a shared core course. Mathematics majors benefit by understanding the science applications inherent in the course. Calculus was developed to solve certain problems, some inherent to science, and some inherent to mathematics itself. Science students get an appreciation for mathematics as the language of science. The scientific method is the process by which scientists, collectively and over time, endeavor to construct an accurate, reliable, consistent and non-arbitrary representation of the 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:

__X__ Introduce students to deductive reasoning

__X__ Develop in the student problem solving techniques appropriate for the course

__X__ Enable the student to understand the underlying principle of formulas

__X__ Enable the student to use and interpret numerical information

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

__X__ **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