LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		06-32	App. 3-6-07	App. 3-27-07

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)

_____New Course _____Course Prefix Change _____Course Deletion

__X__Course Revision _____Course Number and/or Title Change __X__Catalog Description Change

MATH 216 Probability and Statistics for Natural Sciences	
***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. _____ 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)	Thomas H. Shut	12/1/06
Department Chair(s)	Gary Stoudt	12-1-06
College Curriculum Committee Chair		01-30-07
College Dean	Susan Burrows	2/2/07
Director of Liberal Studies *	Mary Sellers	2/8/07
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	Gail Sechrist	3-6-07

* where applicable

Received
FEB - 2 2007
Liberal Studies

Part II. Description of Curriculum Change

1. New Syllabus of Record

I. Catalog Description

MATH 216 Probability and Statistics for Natural Sciences — 3 class hours, 0 lab hours, 3 credit hours, 3c-01-3cr

Prerequisites: MATH 121 or 125

Frequency distributions; graphical representations of data; measures of central tendency and variation; correlation and regression; probability; probability distributions; sampling distributions. Inferential statistics including confidence intervals and parametric and nonparametric tests of hypotheses. Emphasis will be on applications in the natural sciences using graphing calculators and statistical software.

II. Course Outcomes

Upon successful completion of this course, students will be able to:

1. understand the basic concepts of probability and how to apply them.
2. determine probabilities associated with random variables.
3. create and interpret the basic graphical representations of data.
4. use confidence intervals and tests of hypothesis for making decisions about populations based on sample data.

III. Course Outline

1. Describing Data with Graphs (3 hours)
   - 1.1 Variables and Data
   - 1.2 Types of Variables
   - 1.3 Graphs for Categorical Data
   - 1.4 Graphs for Quantitative Data
   - 1.5 Interpreting Graphs with a Critical Eye
2. Describing Data with Numerical Measures (3 hours)
   - 2.1 Measures of Center
   - 2.2 Measures of Variability
   - 2.3 Practical Significance of the Standard Deviation
   - 2.4 Measures of Relative Standing
   - 2.5 Boxplots

3. Describing Bivariate Data (2 hours)

   3.1 Graphs for Qualitative Variable
   3.2 Scatterplots
   3.3 Numerical Measures for Quantitative Bivariate Data

4. Probability (5 hours)

   4.1 Events and the Sample Space
   4.2 Calculating Probabilities using Simple Events
   4.3 Event Composition and Event Relations
   4.4 Conditional Probability and Independence
   4.5 Bayes'Rule (optional)

5. Discrete Distributions (3 hours)

   5.1 Discrete Random Variables and their Distributions
   5.2 The Mean and Standard Deviation for a Discrete Random Variable
   5.3 The Binomial Distribution
   5.4 The Poisson Distribution

6. The Normal Distribution (3 hour)
   6.1 Probability Distributions for Continuous Random Variables
   6.2 The Normal Probability Distribution
   6.3 The Normal Approximation to the Binomial Distribution

7. Sampling Distribution (3 hours)
   7.1 Sampling Plans and Experimental Designs
   7.2 Statistics and Sampling Distributions
   7.3 The Central Limit Theorem
   7.4 The Sampling Distribution of the Sample Mean
   7.5 The Sampling Distribution of the Sample Proportion

8. Large Sample Estimation (2 hours)
   8.1 Point Estimation
   8.2 Interval Estimation for Means and Proportions

9. Large Sample Tests of Hypothesis (6 hours)
   9.1 The Statistical Test of Hypothesis
   9.2 Test for a Population Mean
   9.3 Test for Two Population Means
   9.4 Test for a Population Proportion
   9.5 Test for Two Population Proportions

10. Inference for Small Samples (6 hours)
   10.1 Student's t Distribution
   10.2 Small Sample Inference for a Population Mean
   10.3 Small Sample Inference for Two Population Means
   10.4 Paired Difference Test

10.5 Inference for a Population Variance
10.6 Comparing Two Population Variances
10.7 Wilcoxon Signed Rank Test

11. Analysis of Categorical Data (3 hours)
11.1 Pearson's Chi-Square Statistic
11.2 Goodness-of-Fit
11.3 Contingency Tables

This syllabus leaves 3 hours for tests.

IV. Evaluation Methods

The final grade for the course will be determined by elements such as tests, quizzes, projects, and homework assignments. A substantial proportion of the course grade should be determined by tests.

V. Example Grading Scale

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

VI. Undergraduate Course Attendance Policy

Although there is no formal attendance policy for this class, student learning is enhanced by regular attendance and participation in class discussions. The University expects all students to attend class.

[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

Mendenhall, W., Beaver, R. J., and Beaver, B. M. (2006), *Introduction to Probability and Statistics* (12th ed.), New York: Thomson Brooks/Cole.

Moore, D. S., and McCabe, G. P. (2006), *Introduction to the Practice of Statistics* (5th ed.), New York: W. H. Freeman.

Rossman, A. J., and Chance, B. (2005), *Investigating Statistical Concepts, Applications, and Methods,* Belmont, CA: Duxbury Press.

VIII. Special Resources Requirements

None

IX. Bibliography

Buntinas, M., and Funk, G. M. (2004), Statistics for the Sciences. Pacific Grove, CA: Duxbury Press. ISBN 0534387748.

Chance, B. L., and Rossman, A. J. (2005), Investigating Statistical Concepts, Applications, and Methods. Pacific Grove, CA: Duxbury Press. ISBN 0495050644.

Moore, D. L., and McCabe, G. P. (2005) Introduction to the Practice of Statistics (5th ed.), New York: W. H. Freeman. ISBN 0716764008.

2. Summary of proposed revisions

This revision of MATH 216 reduces the number of credit hours from 4 to 3. This change fits better into the revised 120-credit major programs in the College of Natural Sciences and Mathematics.

We have eliminated topics from the end of the course which overlap with MATH 417, and made other relatively
minor revisions to the description and content. The eliminated topics are Inference for Regression, Analysis of Variance, Multiple Regression, and some Nonparametric Statistics

3. Justification

The topics excluded from the course are already included in MATH 417 Statistical Applications. Students in the minor program have the opportunity to learn essentially the same material even if it is not in MATH 216. In addition, this material is rarely included in introductory statistics courses. This revision will better meet the needs of students in the College of Natural Sciences and Mathematics.

4. Old syllabus

I. Catalog Description

MATH 216 Probability and Statistics for Natural Sciences 4 semester hours
4 lecture hours
0 lab hours
(4c-0l-4sh)

Prerequisites: MATH 121, or MATH 123

Frequency distributions, measures of central tendency and variation, probability, probability distributions, sampling distributions. Hypothesis testing for means, variances, proportions. Correlation, regression, analysis of variance, and nonparametric statistics. Emphasis on applications.

II. Course Objectives

1. Students will know the basics concepts of probability and how to apply them.

2. Students will know how to determine probabilities associated with random variables.

3. Students will know how to create and interpret the basic graphical representations of data.

4. Students will know how to use confidence intervals and tests of hypothesis for making decisions about populations based on sample data.

III. Course Outline

1. Describing Data with Graphs (3 lectures)

   1.1 Variables and Data
   1.2 Types of Variables
   1.3 Graphs for Categorical Data
   1.4 Graphs for Quantitative Data
   1.5 Interpreting Graphs with a Critical Eye

2. Describing Data with Numerical Measures (3 lectures)

   2.1 Measures of Center
   2.2 Measures of variability
   2.3 Practical Significance of the Standard Deviation
   2.4 Measures of Relative Standing
   2.5 The Boxplot

3. Describing Bivariate Data (2 lectures)

   3.1 Graphs for Qualitative Variable

3.2 Scatterplots
3.3 Numerical Measures for Quantitative Bivariate Data

4. Probability (5 lectures)

4.1 Events and the Sample Space
4.2 Calculating Probabilities using Simple Events
4.3 Event Composition and Event Relations
4.4 Conditional Probability and Independence
4.5 Bayes'Rule (optional)

5. Discrete Distributions (3 lectures)

5.1 Discrete Random Variables and their Distributions
5.2 The Mean and Standard Deviation for a Discrete Random Variable
5.3 The Binomial Distribution
5.4 The Poisson Distribution

6. The Normal Distribution (3 lectures)
6.1 Probability Distributions for Continuous Random Variables
6.2 The Normal Probability Distribution
6.3 The Normal Approximation to the Binomial Distribution

7. Sampling Distribution (3 lectures)
7.1 Sampling Plans and Experimental Designs
7.2 Statistics and Sampling Distributions
7.3 The Central Limit Theorem
7.4 The Sampling Distribution of the Sample Mean
7.5 The Sampling Distribution of the Sample Proportion
8. Large Sample Estimation (2 lectures)
8.1 Point Exitmation
8.2 Interval Estimation for Means and Proportions

9. Large Sample Tests of Hypothesis (6 lectures)
9.1 The Statistical Test of Hypothesis
9.2 Test for a Population Mean
9.3 Test for Two Population Means
9.4 Test for a Population Proportion
9.5 Test for Two Population Proportions

10. Inference for Small Samples (5 lectures)
10.1 Student's t Distribution
10.2 Small Sample Inference for a Populaltion Mean
10.3 Small Sample Inference for Two Population Means
10.4 Paired Difference Test
10.5 Inference for a Population Variance
10.6 Comparing Two Population Variances

11. Analysis of Variance (4 lectures)
11.1 What is Analysis of Variance?

11.2 Completely Randomized Design
11.3 Randomized Complete Block Design
11.4 Two-way ANOVA with Interaction

12. Linear Regression and Correlation (4 lectures)
12.1 The Simple Linear Probabilistic Model
12.2 The Method of Least Squares
12.3 ANOVA for Linear Regression
12.4 Inference Concerning the Slope
12.5 Estimation and Prediction

13. Multiple Regression (3 lectures)
13.1 The Multiple Regression Model
13.2 Multiple Regression Analysis
13.3 Interpreting Residual Plots
13.4 Stepwise Regression Analysis
13.5 Building a Multiple Regression Model

14. Analysis of Categorical Data (3 lectures)
14.1 Pearson's Chi-Square Statistic
14.2 Goodness-of-Fit
14.3 Contingency Tables

15. Nonparametric Statistics (4 lectures)
15.1 Wilcoxon Rank Sum Test
15.2 Wilcoxon Signed-Rank Test
15.3 Kruskal-Wallis Test
15.4 Friedman Test
15.5 Rank Correlation Coefficient

IV. Method of Instruction

V. Evaluation Methods

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

70% Tests. Three tests, each worth 100 points, and a final exam worth 120 points. Tests will include definitions, problem solving derivations, and proofs.

13% Quizzes. Eight quizzes worth 10 points each.

17% Project: Each student will prepare a 3-4 page paper worth 100 points on a statistical analysis of data of interest to them. The instructor's approval must be obtained. The paper will be due at the end of the semester.

A total of 600 points are possible. Grades will be assigned as follows:

A – 540 to 600
B – 480 to 539

C – 420 to 479
D – 360 to 419
F – 359 or below

VI. Required Textbooks, Supplemental Books and Readings

Textbook: Mendenhall, Beaver, and Beaver, Introduction to Probability and Statistics, 10th edition, Duxbury Press, 1999.

Supplemental Materials: Greenberg, B. S., Minitab Guide for Moore's The Basic Practice of Statistics, 2nd Ed., W. H. Freeman, New York, 1999.

VII. Special Resources Requirements

None

VIII. Bibliography

Moore, D. S. and McCabe, G. P., Introduction to the Basic Practice of Statistics, 3rd Ed., W. H. Freeman, New York, 1999.

Part III. Letters of Support

Outside of the Mathematics Department, this course is a required in BS Biology/Pre-Veterinary Track, BS Biology/Pre-Medical Track, BS Environmental Health Science, BA Computer Science, BS Computer Science/Applied Track, BS Computer Science/Languages and Systems Track, BS Computer Science/Information Assurance Track, BS Natural Science, BS Natural Science/Pre-Chiropractic Track, BS Natural Science/Pre-Dentistry Track, BS Natural Science/Pre-Optometry Track, BS Natural Science/Pre-Pharmacy Track, BS Natural Science/Pre-Physical Therapy Track, BS Natural Science/Pre-Podiatry Track

Option/Elective in BA Biology, BS Biology, BS Biochemistry, BS Geology/Geology Track, BS Geology/Environmental Track, BS Natural Science/Pre-Engineering Track, BS Natural Science/Science for Disaster Response Track

Support was solicited twice. We understand that this is a busy time of year for departments.

From: Gary Stoudt [Gary.Stoudt@iup.edu]
Sent: Friday 27 October 2006 9:15 AM
To: 'Carl S. Luciano'; 'John Woolcock'; 'Bill Oblitey'; 'Steve Hovan'; 'hershman'; 'Mary Lou Zanich'; 'Jonathan N. Southard'; 'acbrowe@iup.edu'
Subject: MATH 216

Attachments: Proposed_MATH216_three_credit_revision_101206.doc

For those who are interested and are revising curricula to accommodate the new calculus sequence, the Mathematics Department just approved a revision to MATH 216 to change the credit load from 4 to 3. Once the paperwork is in order, it will go through the process.

Essentially, we removed content that overlaps with MATH 417: inference for regression, multiple regression, most nonparametric methods (although we retained Wilcoxon).

As part of that process, I would appreciate emails of support from Carl (for Pre-Vet and Pre-Med tracks), Jonathan (MATH 216 is a possible controlled elective in BIOC), Bill (all majors), Steve (MATH 216 is a possible controlled elective in GEOS-BS), Andy (for all the Pre-s), Ken (Pre-Engineering).

Naturally, if you have concerns about the new MATH 216, we can work with you.

Thank you for your diligence and patience with us and our curriculum work.

Gary

From: Gary Stoudt [Gary.Stoudt@iup.edu]
Sent: Wednesday 15 November 2006 10:08 AM
To: 'Carl Luciano'; 'William Oblitey'; 'Ken Hershman'
Subject: FW: MATH 216

Attachments: MATH 216 Complete to UWUCC.doc

Sorry to bug you again, but we are trying to have this ready for fall. If you would like to discuss this, just let me know. Thanks.

Gary

Gary Stoudt
Mathematics Department

-----Original Message-----
From: Gary Stoudt [mailto:Gary.Stoudt@iup.edu]
Sent: Friday 27 October 2006 9:15 AM
To: 'Carl S. Luciano'; 'John Woolcock'; 'Bill Oblitey'; 'Steve Hovan'; 'hershman'; 'Mary Lou Zanich'; 'Jonathan N. Southard'; 'acbrowe@iup.edu'
Subject: MATH 216

For those who are interested and are revising curricula to accommodate the new calculus sequence, the Mathematics Department just approved a revision to MATH 216 to change the credit load from 4 to 3. Once the paperwork is in order, it will go through the process.

Essentially, we removed content that overlaps with MATH 417: inference for regression, multiple regression, most nonparametric methods (although we retained Wilcoxon).

As part of that process, I would appreciate emails of support from Carl (for Pre-Vet and Pre-Med tracks), Bill (all majors), Ken (Pre-Engineering).

Naturally, if you have concerns about the new MATH 216, we can work with you.

Thank you for your diligence and patience with us and our curriculum work.

Gary

Gary Stoudt
Mathematics Department

Geoscience

January 29, 2007

To: Gary Stoudt, Mathematics Department

From: Steve Hovan, Geoscience Dept

RE: proposed revision of Math 216 – Probability and Statistics

Gary,

Thank you contacting us about the proposed changes in the Probability and Statistics course (MATH216) offered by the Mathematics Department. The Geoscience faculty reviewed the changes identified in the copy of the course proposal you provided and fully support the changes. Math 216 is offered as a controlled elective in our programs thus overall the changes will have no negative impact for our students. In fact, the reduction in credit hours to 3cr will likely make it easier for students to include in their sequence.

I wish you and the department all the best with your curriculum revisions.

Sincerely,

Steve Hovan

Chair, Geoscience Department

Natural Science

-----Original Message-----
From: Andrew C. Browe [mailto:acbrowe@iup.edu]
Sent: Saturday 28 October 2006 2:41 PM
To: Gary.Stoudt@iup.edu
Subject: Re: MATH 216

Gary Stoudt, Mathematics Department
The Natural Science Program formally supports the change of MATH 216 from a 4 credit course to a 3 credit course. This course was still fulfill the requirements of the Natural Science students who pursue professional school and allows these student the extra 1 credit hour flexibility in their undergraduate pre-professional program, Thus I support this change in credit hour.

Andrew Browe
Coordinator, Natural Science Program

Physics

-----Original Message-----
From: hershman [mailto:hershman@iup.edu]
Sent: Thursday 16 November 2006 11:14 AM
To: Gary.Stoudt@iup.edu
Subject: Re: Statistics

Gary ,
Thank you for your assistance in searching out this information. I just naturally assumed that Pitt had a division of labor and assigned their

prob and stats to the Math Department so I looked only at their Math requirements. Looking at the Pitt catalog 99- 02 it appears that only Industrial Engineering requires ENGR 0020. Civil Engr requires CEE 1102, Prob and Stat in CE, and Electrical Engr has a Prob and Stat Elective We would judge that your new MATH 216 and Pitt's requirements are in the same ball park. At least you are providing an introduction to the subject.
Whether you can provide the adequate base for the different needs of the three pre-Engr programs we try to prepare for Pitt's programs - that is a hard objective to achieve.
The Department is satisfied that no major loss is being imposed on our Pitt Pre-Engr students by taking your new MATH 216 that can't be addressed at Pitt if need be.

Therefore we support your proposal.

Ken

Chairman
IUP Physics 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
_____ 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.

__X__ 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.

__X__ 5. Continue learning even after the completion of their formal education.

__X__ 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. This is the perfect paradigm for statistical analysis.

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.

This is the nature of statistics itself.

4. Historical consciousness.

The student will become aware of the historical significance of statistics in the development of western civilization and its importance in contemporary times.

5. Scientific Inquiry.

Statistics is essential to scientific inquiry and problem solving techniques used through out science.

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

It is important that all students develop a sense of the importance of statistics to society, given that statistics is used (and misused) in nearly every aspect of their lives, from politics to medicine. In addition, the course of study should develop in the student a feeling of confidence in their ability to understand the statistics cited in their lives and careers.

D. Collateral Skills:

2. Use of computing technology.

Statistical software or hand-held technology is an integral part of the course.

LIBERAL STUDIES COURSE APPROVAL, PARTS 4-6:

This is a two-section course in the spring and a one section course in the fall. Due to scheduling and preparation concerns, it is almost always the case that the same instructor teaches both sections in the spring. The syllabus includes topics which introduce the students to basic statistical concepts and techniques. These are standard topics in a first statistics course. This course is governed by the Mathematics Department Statistics Curriculum Committee, which oversees content and methods in all statistics classes taught in the department.

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 because the primary purpose is the development of quantitative skills. In this course we are concentrating on developing statistical techniques and insight. In this course we would like to exercise the exception to the use of a work of fiction or non-fiction because the primary purpose is the development of quantitative skills. We do make use of readings in this course, but they are typically from anthologies or from articles in scientific disciplines. These readings are at a level that introductory students can understand.

This course is an introductory course, but for a specific audience: natural science and mathematics students. It does not differ from what is provided to beginning mathematics majors. This 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. Science students get an appreciation for mathematics as the language of science and for statistics as a tool to develop and test hypotheses. 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. Statistics is essential to the development and testing of these theories.

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

__X__ **B.** Mathematics courses designed for Liberal Studies

Additional criteria which courses in Category B must meet:

__X__ Develop the student's confidence in handling numerical problems and data.

__X__ Be sensitive to the diverse background characteristics of the student

__X__ Include elements on the history or appreciation of mathematics

__X__ Introduce the hand-held calculator or the computer as a tool