COVER SHEET: Request for Approval to Use W-Designation

TYPE I. PROFESSOR COMMITMENT

(✓) Professor _Gary Stoudt_   (Mathematics)   Phone X 2420

(✓) Writing Workshop? (If not at IUP, where? when? _yes, IUP   Aug. 24,25,26 1992_

(✓) Proposal for one W-course (see instructions below)

(✓) Agree to forward syllabi for subsequently offered W-courses? _yes_

TYPE II. DEPARTMENT COURSE

( ) Department Contact Person _____   Phone _____

( ) Course Number/Title _____

( ) Statement concerning departmental responsibility

( ) Proposal for this W-course (see instructions below)

TYPE III. SPECIFIC COURSE AND SPECIFIC PROFESSOR(S)

( ) Professor(s) _____   Phone _____

( ) Course Number/Title _____

( ) Proposal for this W-course (see instructions below)

SIGNATURES:

Professor(s) _Gary Stoudt_

Department Chairperson _Gerald Buriok_

College Dean _William J. Cale_

Director of Liberal Studies _D. Ashlin_

COMPONENTS OF A PROPOSAL FOR A WRITING-INTENSIVE COURSE:

I. "Writing Summary"--one or two pages explaining how writing is used in the course. First, explain any distinctive characteristics of the content or students which would help the Liberal Studies Committee understand your summary. Second, list and explain the types of writing activities; be especially careful to explain (1) what each writing activity is intended to accomplish as well as the (2) amount of writing, (3) frequency and number of assignments, and (4) whether there are opportunities for revision. If the activity is to be graded, indicate (5) evaluation standards and (6) percentage contribution to the student's final grade.

II. Copy of the course syllabus.

III. Two or three samples of assignment sheets, instructions, or criteria concerning writing that are given to students. Limit: 4 pages. (Single copies of longer items, if essential to the proposal, may be submitted to be passed among LSC members and returned to you.)

Please number all pages. Provide one copy to Liberal Studies Committee.

1

Writing Summary
MA 350 History of Mathematics

I am proposing to teach History of Mathematics, MA 350, as a writing intensive ("W") course. This course is a two credit course offered every Spring Semester. It is a required course for the BS in Education – Mathematics Education degree. The students are typically Junior or Senior Secondary Mathematics Education majors. My goals for the course are :

- to give life to the <u>people</u> of mathematics;
- to provide an overview of mathematics;
    a. to see how the various mathematics courses the students have taken fit together,
    b. to see where these courses came from,
- to show that mathematics is part of our culture;
- to indicate how one might use history in future teaching;
- to improve mathematical communication skills.

The types of writing in this course will help pursue these goals.

1.   Writing to Enrich the Course

This type of writing may serve to lead the student on a path tangential to the material in the course. The students will write short (to fit on a 4 by 6 index card) synopses of approximately ten papers (or perhaps films) on the history of mathematics. These papers are to be researched and chosen *by the student*. This will acquaint the student with the literature in the history of mathematics and, depending on the content of the paper, will help meet some of the stated goals of the course. A synopsis should contain complete bibliographic information and a short summary of the paper.

This assignment is also useful in developing a lifelong habit of gathering and maintaining a file of information that will be valuable to teachers. In addition, this will provide ideas to the students that they may wish to develop in the required research paper. The students will be encouraged to go beyond the required ten synopses in order to build a library of information. Any additional synopses will be ungraded.

These synopses will be graded on completeness, adherance to bibliographic format, and instructiveness of the summary. It is expected that the students follow the conventions of standard written english (ESWE). I will however, accept (even encourage) a loose, familiar style for the summaries.

50 points : 8.3% of final grade

2.   Writing to Facilitate Oral Communication

The students will give an oral report on the life and work of a particular mathematician. As a preliminary assignment to this report, the student will be expected to write short synopses of papers by or about this mathematician (as above). The student will then compile these into an annotated bibliography. These will not be graded. Finally, the student will give sometime during the semester a twenty minute oral report on the mathematician including his/her life, a feel for his/her time period, contributions to mathematics and other fields, and anecdotes. The student becomes the class "expert" on this mathematician, and should be able to add to the class discussion whenever this mathematician is brought up in class.

A percentage of the grade will be peer evaluation and the rest will be by the instructor. The grade will be based on meeting the guidelines supplied, preparation, delivery, style, and entertainment value. Admittedly, most of these are quite objective.

Writing : ungraded
Oral report : 50 points (8.3% of final grade)

3.   Writing to Synthesize Ideas

Towards the goal of piecing together (seemingly) disparate mathematical fields, the students will write four essays that will address how certain mathematical fields are interrelated. Some examples could be : "how did the development of analytic geometry pave the way for the development of calculus?"; "how is 'modern algebra' related to ordinary high school algebra?"; "Complex numbers may have been introduced to help solve cubic equations. In what other areas have they been used to 'fill in gaps'?"; "discuss how geometry and topology are linked by the concept of curvature."

The construction of the essay will be important in determining the grade. Of course, the conventions of ESWE must be followed. I will also grade based on correctness of content. A checksheet will be provided to the students.

100 points (25 each) : 16.7% of final grade

4. Research Writing

There will be one major research paper in this course. This will allow the student to master one aspect of the history of mathematics. The length will be up to the individual student but there will be guidelines for him/her to follow (see attached copy of the assignment).

The students' progress will be monitored by other assignments. The synopses described above will allow me to see if the students are having difficulty finding a suitable topic and/or suitable materials. The students will also be assigned to write a preliminary report discussing the following : topic, what he/she intends to do with the topic, what questions will be addressed, any questions for the instructor, and a preliminary bibliography. The students will also submit a draft of the paper that will be evaluated so that they can revise and resubmit the finished paper. Only the finished paper will be graded, but the preliminary assignments will be required to submit the finished paper.

The grade will be based on content, meeting the stated criteria (see attached handout), adherance to the conventions of ESWE, and style. A checksheet will be provided to the students.

150 points : 25% of final grade

5. Writing for Evaluation

There will be a midterm and a final examination in this course, each of which will contain a writing component in the form of short essays. The essay topics will be distributed before the exams, so that I can expect structured essays. The exams will also contain true – false questions, fill in the blanks, multiple choice, and short answer questions. On the midterm exam, the writing questions (short answer and essay) constitute approximately 40% of the total. On the final exam the percentage is approximately 60%.

Midterm exam : 100 points of which 40 are writing
Final exam : 150 points of which 90 are writing
Writing on exams : 21.7% of final grade

Writing is 71.7% of final grade.
If the oral report is included, it is 80% of final grade.

Math 350 History of Mathematics (writing intensive)   Spring, 199X

2c – 01 – 3sh

Prerequisite : Completion of a calculus sequence or permission of the instructor

Instructor : Professor Gary Stoudt

Texts : (will be one of the following)

> *Mathematics and Its History*, by John Stillwell, Springer – Verlag
>
> *The History of the Calculus and Its Conceptual Development*,
> by Carl Boyer, Dover
>
> *A History of Mathematics*, by Carl Boyer and Uta Merzbach,
> John Wiley and Sons

Office/Phone : 317 Stright/ext. 2420 (357 – 2420)

Office Hours : XXX

Catalog Description : The history of mathematics is concerned with the origins, philosophy, and development of the mathematical sciences.

Goals of the Course :

- to give life to the people of mathematics;
- to provide an overview of mathematics;
  a. to see how the various mathematics courses the students have taken fit together,
  b. to see where these courses came from,
- to show that mathematics is part of our culture;
- to indicate how one might use history in future teaching;
- to improve mathematical communication skills.

Some Information About the Course : (will be one of the following)

   This course is designed as a survey of the history of mathematics. Far too much mathematics has been done in the last 4000 years to treat its entire history carefully, so we will concentrate on one theme : the development of calculus. To do this we will have to discuss the development of algebra, geometry, and trigonometry. Consequently we will discuss the history of most of mathematics that is discussed in the high schools; this is intended to benefit the prospective teacher. Few topics in modern mathematics will be discussed.

(OR)

(From the Preface to *Mathematics and Its History*)

One of the dissappointments experienced by most mathematics students is that they never get a course in mathematics. They get courses in calculus, algebra, topology, and so on, but the division of labor in teaching seems to prevent these different topics from being combined into a whole. In fact, some of the most important and natural questions are stifled because they fall on the wrong side of topic boundary lines. Algebraists do not discuss the fundamental theorem of algebra because "that's analysis". . . for example. Thus if the students are to feel they really know mathematics by the time they graduate, there is a need to unify the subject. . . . [We] aim to give a unified view of undergraduate mathematics by approaching the subject through its history.

Grading : Your grade will be based on your assignments and test scores. I will follow the 90% A, 80% B, 70% C, 60% D, below 60% F grading system. I reserve the right to make upward adjustments in this scale; that is you may receive a higher grade than indicated if circumstances warrant.

Synopses	50 points	(8.3%)
Oral Report	50 points	(8.3%)
4 Essays	100 points	(16.7%)
Research Paper	150 points	(25%)
Midterm Exam	100 points	(16.7%)
Final Exam	150 points	(25%)

This is a writing intensive course and the types of writing in this course will help pursue the course goals. Writing will account for 71.7% of your final grade. It is expected that your writing will conform the the conventions of edited standard written English (ESWE). ESWE is explained later in this syllabus. You should also note that the style and flow of your writing will play an important role in your grade.

<u>Attendance Policy</u> :

Class attendance in this course is very important and missing a class will put you at a disadvantage in your effort to master the course material.

Absence from the midterm will result in a score of zero unless I excuse you in the case of emergencies. You must be excused **in advance** of the midterm. This same policy holds in the case of due dates for other assignments. Absence from the final exam will result in a score of zero unless excused by the proper authorities.

<u>Statement of Academic Honesty</u> :

The midterm and final examinations are formal evaluations; the work you do on these must be your own. You must not confer with other students, look at other students' papers, or use unauthorized information while you are involved in these exercises. Your name on an assignment is your guarantee that the work is completely your own.

According to the Random House College Dictionary, plagiarism is "the appropriation or imitation of the language, ideas, and thoughts of another author, and representation of them as one's original work." Scrupulous care must be taken to avoid this in your writing. Naturally the source of a direct quotation must be cited. Also, when you take the ideas of another and rephrase them you must cite your source. In historical work everything except the common and readily available facts needs a reference to the work where you learned this information.

Mutilation of library materials is a crime, both literally and figuratively. Photocopies are cheap and readily available, so there is no excuse for defacing library holdings in any way.

<u>Course Outline</u> : (if we use *Mathematics and Its History*, by John Stillwell)

A. The Theorem of Pythagoras
B. Greek Geometry
C. Greek Number Theory
D. Infinity in Greek Mathematics
E. Polynomial Equations
F. Analytic Geometry
G. Projective Geometry
H. Calculus
I. Infinite Series
J. The Revival of Number Theory
K. Elliptic Functions
L. Mechanics
M. Complex Numbers in Algebra
N. Complex Numbers and Curves
O. Complex Numbers and Functions

(if we use Boyer texts)

A. The Heroic Age
       1. Quadrature of lunes
       2. Duplication of the Cube
       3. Paradoxes of Zeno

B. The Age of Plato and Aristotle
       1. Origin of Analysis
       2. Method of Exhaustion

C. Euclid

D. Archimedes

E. Apollonius

F. Greek Trigonometry

G. Revival and Decline of Greek Mathematics
       1. Diophantus
       2. Pappus

H. China and India

I. The Arabic Hegemony
       1. Algebra
       2. Trigonometry

J. Europe in the Middle Ages
       1. Cubic Equations
       2. Theory of Numbers and Geometry
       3. Oresme

K. The Renaissance

L. ProtoCalculus
       1. Prelude to Modern Mathematics
       2. The Time of Fermat and Descartes
       3. A Transitional Period

M. Newton and Leibniz

N. The Bernoulli Era

O. The Age of Euler

P. Mathematicians of the French Revolution

Q. The Time of Gauss and Cauchy

R. The Arithmetization of Analysis

S. The Rise of Abstract Algebra

T. Aspects of the Twentieth Century

Policy For The Use Of Edited Standard Written English Conventions
by Barbara E. Walvoord

Suppose a group of people were living on a small island, all using the same forms of language, until one day the island broke in two, separated by impassable rough water. In 100 years, would the people on both halves still use the same language forms? No. Human language is always changing. Language on each half of the island would evolve with different forms and rules; neither would be "better" in any absolute sense − −just different. Similarly, in the U.S., language variations have developed among people separated by culture or geography.

However, a common societal pattern is that the ruling class imposes its dialect on everyone else. In the U.S., the standard dialect is the dialect of the white middle and upper classes. Dialects developed by people of color and by people who have been poor or geographically isolated (as in Appalachia) are often incorrectly considered "bad" English. But actually such forms are different, not "bad." Each dialect has its own rules and its own uses.

One of the tasks of a good education is to make you aware of these facts about language. Another task of education, however, is to prepare you to function effectively in the world where readers generally expect you to control Edited Standard Written English (ESWE). Thus in this class, too, you must use ESWE. Here is the standard :

On finished, final, formal papers, in order to receive a passing grade, you must have no more than an average of 2 departures from ESWE per page, in any combination of the following areas :

- all quoted material enclosed in quotation marks
- spelling (a typo counts as a misspelling)
- end of sentence punctuation (avoid run − on, comma splice, fragment, or misuse of semicolon). Occasionally, you may use a fragment or comma splice for a special effect. Label it in the margin.
- verb forms (use ESWE forms of lie, lay, etc., and ESWE rules for adding − ed and − s, using helping verbs,etc.)
- verb tense (avoid confusing shifts in verb tense)
- agreement of subject and verb
- pronoun form (use ESWE rules to choose between I and me, she and her, who and whom, etc.)
- agreement of pronoun with antecedent (the antecedent is the word the pronoun refers to)
- apostrophe, − s, − es
- sentence sense (words omitted, scrambled, or incomprehensible)

Note that this policy applies only to finished, final, formal writing. In this class, it is perfectly legitimate to pay little attention to ESWE conventions on informal writing or drafts where you need your full attention for structure and content.

Acknowledgements :

This syllabus and the ideas for assignments relied heavily on the following materials :

Notes and Handouts by Fred Rickey, Bowling Green State University, from the 1992 M.A.A. Shortcourse – History of Calculus

Using Writing to Teach Mathematics, edited by Andrew Sterrett,
MAA Notes Number 16

Notes and Handouts by Barbara Walvoord, Loyola College, Baltimore, from the August, 1992 IUP Writing Workshop

"Writing – Intensive Courses at IUP" package

Oral Report On A Mathematician

Your assignment is to report to the class on the life and work of a particular mathematician. This assignment will acquaint you with library research and will provide the class with a change of pace when you give your report. You will also become the class expert on your mathematician, supplying comments when your mathematician comes up in discussion.

Your report should take 20 minutes. Include information about the mathematician's life, his/her time period (to place into mathematical context), contributions to mathematics and other fields, facts of interest, and any anecdotes that you might find. You must explain some mathematical contribution by the mathematician.

You must supply synopses on index cards, since part of the intent of the assignment is for you to read a wide variety of materials about or by your subject. (The format for these index card synopses is given on another handout.)

The questions asked on the next page of this assignment are designed to acquaint you with a few useful reference works dealing with the history of mathematics. Answer the questions on this page and hand it in at the time of your report. Some of the questions ask you to look up works by and about the mathematician. Make a synopsis index card for each work. You are to hand these in as well.

Your mathematician (YM) is _____.

0. Look up YM in our text. Read the relevant pages and take notes.

1. Look up YM in the Dictionary of Scientific Biography (in our library).

Make an index card which includes the following information :

The article is in volume _____ , pages _____ , and is by _____. (follow with a synopsis)

You should read the article and take notes.

2. Look up YM in an encyclopedia. On an index card give the name of the encyclopedia, date of publication, volume, pages, and author (signed articles are more reliable). Read the article and take notes.

3. Did you note any discrepancies between the above sources?_____
If so, what?

4. What works <u>by</u> YM are in our library? Make index cards, and include a brief description of the contents (<u>not</u> a synopsis).

5. What works <u>about</u> YM are in our library? Read any that interest you and make synopses index cards.

6. Are the collected works of YM published? _____ If so, make an index card with the reference.

7. Look up an anecdote about YM in "In Mathematical Circles" by Howard Eves (in our library). Give the volumes and page numbers where they appear.

Where possible, answer these questions on this sheet.

Research Paper   150 points

You are to write a research paper on a topic of your choice. This is meant to be an interesting and enjoyable assignment, not a chore. So, choose a topic with care. The only restriction is that you do not do your research paper on the same mathematician in your oral report. You should think about the choice of a topic for your paper while you are doing your synopses of papers. Some of the categories your topic might come from are :

- concept evolution, for example, the development of the function concept;
- topical subject, for example, the history of quadratic equations;
- biographical, for example, the life *and* work of a particular mathematician;
- cultural and philosophical impact of some idea in mathematics, for example, perspective, non – Euclidean geometry;
- focus on a portion of some era in mathematics, for example Hindu, African, Chinese, Japanese, Hebrew.

Each paper must meet the following requirements :

- The paper is to be on the history of mathematics. It cannot be all history or all mathematics. It should contain a reasonably non – trivial piece of mathematics as well as the history and background of that mathematics.

- Enough expository material should be included so as to make the paper self – contained. If you have doubts, ask a friend to read it.

- You should use a variety of research materials and must give careful references for your sources. You will want to use books and encyclopedias, but I especially encourage you to use journals. Your paper should include a bibliography listing your sources and they should be cited in the body of your paper when appropriate.

- Your paper must be typed. I strongly encourage you to use a word processor. If you do not know how to use one, now might be a good time to learn. The length and format of the paper is up to you. Papers have a natural length. You are telling a story which needs certain background, exposition, and detail. When that is successfully done, you are finished. Please submit two copies of your paper so that I may keep one copy.

I will be supplying you with a checksheet to further guide you in writing this research paper. This checksheet must be submitted with the paper and I will not accept a paper whose checksheet is not completed.

The grading of your paper will be based upon : the historical and mathematical content; the significance, interest, accuracy, and completeness of the material; the accuracy, scope, and significance of your references (and the proper use and citation of them); and finally, the style in which it is written. Papers that do not conform to the standards of edited standard written english (ESWE) will not be accepted. A grade of A will be given only for truly excellent work; B for good, solid work; C for average work; D and F for unsatisfactory work.

To make certain that you devote sufficient thought to your paper, I will be collecting preliminary assignments.

1. You will also write a preliminary report discussing the following : topic, what you intend to do with the topic, what questions will be addressed, any questions for me, and a preliminary bibliography. The more details you include, the more feedback you will get from me. Do not be afraid to discuss any problems you are having.

2. You will also submit a draft of the paper that will be evaluated so that you can revise and resubmit the finished paper. The secret of good writing is rewriting!

Only the finished paper will be graded, but the preliminary assignments will be required to submit the finished paper.

Summary of Dates

Preliminary Report Due XXX
Draft Due XXX
Final Research Paper Due XXX