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REVISION APPROVAL COVER SHEET FOR CONTINUATION OF W-DESIGNATION

TYPE II DEPARTMENT COMMITMENT

Professor Dr. Gary Stoudt
 Department Mathematics Department
 Email gsstoudt@iup.edu
 Course MATH 350 History of Mathematics

Received
 MAR 11 2014

Please provide answers to these questions on the next page:

1. Include the most recent syllabus for the Type II course.

Liberal Studies

Addendum: This does not have to be the syllabus of record, since the syllabus of record could potentially be rather dated. These syllabi are not meant to replace the syllabus of record; rather they represent how the department is currently teaching a particular Type II W course. These syllabi **do not** have to be revised using the Liberal Studies objective format.

2. Include a new "Statement Concerning Departmental Responsibility". The statement of departmental responsibility" explains how the department will ensure that the writing component is present regardless of who is teaching the course. It needs to identify the specific department group or individual who is responsible for ensuring this.

Addendum: This section should show how the department is going to support the W nature of a Type II course, not repeat what is being taught in the course. For example, there is no need to repeat the writing criteria (5000 words, essays exams, research papers etc.) in this section as the type of writing and/or assignments might change over the years. The responsibility relies on the department and they should explain how it will be supporting the W course to ensure that it is being taught in the proposed manner. That may be creating a community of writers within the department or a yearly meeting(s) to discuss Type II offerings. It might also be associated with particular outcomes from the course (often in accredited programs).

Approvals:	Signature	Date
Professor (s)	<i>Gary Stoudt</i>	3/7/2014
Department Chair	<i>[Signature]</i>	3/7/2014
College Dean	<i>[Signature]</i>	3/7/14
Director of Liberal Studies	<i>[Signature]</i>	3/14/14
UWUCC Co-chair(s)	<i>Gail Sechrist</i>	4/1/14

TYPE II DEPARTMENT COMMITMENT

Professor Dr. Gary Stoudt Department Mathematics Department

Course MATH 350

1. Include the most recent syllabus for the Type II course.

MATH 350 History of Mathematics (W)

Spring, 2013

Prerequisite: MATH 122 or 126

Instructor: Dr. Gary Stoudt

Texts: *Classics of Mathematics*, edited by Ronald Calinger (Pearson) and *How to Read Historical Mathematics* by Benjamin Wardhaugh (Princeton)

Class Time, Room: MWF 1:25-2:15, STR 202

Office/Phone: 314 Stright/ext. 7-4764 (724-357-4764)

E-mail: Gary.Stoudt@iup.edu

Office Hours: MF 9:00-10:00, T 11:00-12:00, Th 8:00-9:00

Course Description (Undergraduate Catalog)

Development of the central concepts of mathematics from ancient times up to the development of calculus in the seventeenth century. Mathematical concepts will be placed in historical perspective. The use of the history of mathematics as a pedagogical tool and its relationship to other sciences will be addressed.

Goals of the Course:

The goals of the course are:

- to give life to the people of mathematics;
- to illustrate that mathematics did not simply "appear" in a polished form;
- to see how the various mathematics courses the students have taken fit together;
- to show that mathematics is part of our culture;
- to indicate how one might use history in future teaching;
- to improve mathematical communication skills (reading, writing).

Some Information about the Course:

This course is designed as a survey of the history of mathematics by looking at major works, ideas, and people of the discipline. Far too much mathematics has been done in the last 4,000 years to treat its entire history carefully, so we will pick and choose topics. We will discuss the history of most of the mathematics that is discussed in the high schools; this is intended to benefit the prospective teacher. In addition, this will give insight into the courses you have already taken. Unfortunately, we will not have time to discuss topics in modern mathematics.

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.

Your grade will be made up of assignments such as the following: Homework, Papers, Midterm Exam, Final Exam.

This is a writing intensive course and the types of writing in this course will help pursue the course goals. Writing will account for a significant portion of your final grade. It is expected that your writing will conform to the conventions of edited standard written English. You should also note that the style and flow of your writing will play an important role in your grade. Writing is defined broadly enough to include written homework. I expect your homework assignments to be written in correct mathematical English; a list of equations to reach a conclusion is not acceptable.

Writing Summary (anything not explained here is discussed on a separate page)

1. One Paper: Original Source Material (50 points)
2. Three *How to Read Historical Mathematics* Projects (100 points total)
3. Blog: Life and Work of a Mathematician (50 points)
4. Exams (midterm, 100 points; final, 100 points)
Midterm is scheduled for Friday, March 14 (right before Spring Break)
Final is scheduled for Wednesday, May 7, 12:30-2:30

There will be a midterm and a final examination (the final examination will be treated like a second midterm) in this course, each of which will contain a writing component in the form of a short essay and short answer questions. The essay topics will be distributed before the exams, so that I can expect structured essays. The exams may also contain true/false questions, fill in the blanks, and multiple choice questions. On the midterm and final exams, the writing questions (short answer) constitute approximately 30% of the total. You will be responsible for mathematical developments and ideas (but not detailed proofs) and for doing mathematics in the style of the various time periods. More information will be given near the date of the exams.

5. Homework (various points)

Throughout the semester there will be various homework assignments, mostly involving problem solving (i.e. "usual" mathematics homework).

Attendance Policy:

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. If you are not in class you cannot benefit from classroom discussions that are an integral part of the course. With this in mind this class has the following policies.

- Absence from the midterm not cleared with me beforehand will result in a score of zero.
- Absence from the final exam not cleared with me beforehand will result in a score of zero.
- Homework is due at the beginning of the class period. No late assignments not cleared with me beforehand will be accepted. Any homework that is not turned in on time will result in a score of zero. If you choose to be absent, you may turn in an assignment early or have someone turn it in for you. You are responsible if this person does not turn in an assignment on time.

Statement of Academic Honesty:

Any work that you turn in to me is for a formal evaluation; 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.

Paper: Original Source Material (50 points)

Due: Monday, May 5

This assignment is to do a critical reading of an original source in the history of mathematics. This is much like what our author has done in his textbook, but on a smaller scale. Do not pick source material that is too hard for you! You may not do a source that is analyzed in class or in Dunham's book. **You may not do anything from Euclid's *Elements* or from Simon Stevin.**

The paper **must** include:

- a detailed description of what the author is doing and the mathematics he/she is using,
- an explanation of how the mathematics was done (that is, do some mathematics)

We will be doing this type of analysis in class, so you will have some idea of what is expected. The paper must be word-processed, including the mathematics. The paper should be as long as it takes to analyze the original source. You are not merely re-writing the source. You should be filling in missing details, doing the calculations, doing any algebra that is skipped over, etc.

On finished, final, formal papers, in order to receive a passing grade, you must have no more than an average of two departures from standard written English per page, in any combination of the following areas: all quoted material enclosed in quotation marks, spelling (a typographical error counts as a misspelling), end of sentence punctuation (avoid run-on, comma splice, fragment, or misuse of semicolon), verb forms (forms of lie, lay, etc., and edited standard written English 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 (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).

Birkhoff, *A Sourcebook in Classical Analysis*

Calinger, *Classics of Mathematics*

Grattan-Guinness, *Landmark Writings in Western Mathematics 1640-1940*

Hawking, *God Created the Integers*

Newman, *The World of Mathematics*

Smith, *A Source Book in Mathematics*

Struik, *A Source Book in Mathematics*

Van Heijenoort, *From Frege to Gödel: A Source Book in Mathematical Logic, 1879-1931*
Anything entitled "Collected Papers," for example Cayley, *The Collected Mathematical Papers*

Further ideas for readings can be found at <http://cerebro.cs.xu.edu/math/math300/02s/papers.html>
(The Original Sources part.)

Photocopy the source you wish to use and return the book to the library so others can use it!

For information on reading critically, see <http://www.utoronto.ca/writing/critrdg.html>

You must turn in your paper in electronic format. There is no need to print it. **The website software Turnitin will be used on this paper to look for plagiarism.**

Use of the Writing Center

Website: <http://www.iup.edu/writingcenter/default.aspx>

A trained undergraduate or graduate student tutor will work with you on a one-to-one basis at any stage of composing--finding ideas, drafting, revising, documenting sources, or proofreading. The website has information on supporting and organizing ideas, grammar, punctuation, style, and citation.

How to Read Historical Mathematics Projects

These projects must be word-processed, including the mathematics. The project should be as long as it takes to do the job. Answer the question, explain yourself, and describe what you found out.

Project 1 (30 points) Due: Friday, February 15

Read the Preface and Chapter 1 What Does It Say?

On page 18, complete To think about (1) and (3)

Project 2 (40 Points) Due: Friday, April 5

Read Chapter 2 How Was It Written?

On page 45, complete To Think about (1) and (3)

Project 3 (30 Points) Due: Friday, April 26

Read Chapter 3 Paper and Ink

On page 70, complete To Think about (1) and (2)

Blog: Life and Work of a Mathematician (50 points)

Due: Friday, March 7

This assignment is to report on the life and work of a mathematician. Make sure you choose someone whose work you understand.

This assignment will reacquaint you with library research and introduce you to blog writing. The blog **must** include

- information about the mathematician's life,
- information about his/her time period (to place into mathematical context),
- information about his/her relationship to other mathematicians/scientists of his/her era,
- his/her contributions to mathematics and other fields,
- facts of interest about the person,
- any anecdotes that you might find,
- you must explain some mathematical contributions by the mathematician (that is, **show** some mathematics).

Your blog entries must also include footnotes or endnotes and a bibliography as necessary. Internet resources are acceptable; you should, however, make an attempt to judge the source for your blog reader before linking to it.

The questions asked on the next page are designed to acquaint you with a few useful reference works dealing with the history of mathematics.

Your blog will be live, so you do not want to have grammatical and spelling errors in it. Please be aware of the following as you post: all quoted material enclosed in quotation marks, spelling (a typographical error counts as a misspelling), end of sentence punctuation (avoid run-on, comma splice, fragment, or misuse of semicolon), verb forms (forms of lie, lay, etc., and edited standard written English 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 (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).

The following journals are good places to look for ideas and sources. Look in the library or the Secondary Education Lab (Stright 211): *American Mathematical Monthly*, *Scientific American*, *ISIS*, *College Mathematics Journal*, *For the Learning of Mathematics*, *Historia Mathematica*, *The Mathematical Intelligencer*, *Mathematics Magazine*, *Mathematics Teacher*, *School Science and Mathematics*. You should also consult general history of mathematics texts and the *Dictionary of Scientific Biography* at the Reserve Desk in the library.

Further ideas for mathematicians can be found at
<http://cerebro.cs.xu.edu/math/math300/02s/papers.html>

Information on a Mathematician (Blog)

[This is intended to help you get started on writing your blog.]

Your mathematician (YM) is _____.

The correct pronunciation of the name is _____.

0. Look up YM in our texts. Read the relevant pages and take notes. Cite the pages here.

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

Include 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. Look up YM on the World Wide Web at the MacTutor History of Mathematics Archive <<http://www-groups.dcs.st-and.ac.uk:80/~history/>> and, if appropriate, at the Biography of Women Mathematicians <<http://www.scottlan.edu/lriddle/women/women.htm>>. Read the article and take notes.

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

5. What works by YM are in our library? Include a brief description of the contents (not a synopsis). Include microfiche, microfilm, etc.

6. What works about YM are in our library? Read any that interest you.

7. Are the collected works of YM published? _____ If so, what is the reference?

8. 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.

Course Outline

All readings are from *Classics of Mathematics*, edited by Ronald Calinger unless otherwise noted. All sections should be read and re-read. Changes to the outline, if any, will be announced in class.

Click on the link for the homework assignment **before** you do the readings because this also contains things to look for in the reading that will get our discussions started.

Everything can be found at <http://nsm1.nsm.iup.edu/gsstoudt/history/ma350/readings.html>

First Reading Assignment: Babylonia and Egypt

- From A Mathematician's Apology- G. H. Hardy, page 1
This reading sets the tone for the course.
- Chapter I (Protomathematics in the Late Age of Stone and in Ancient Mesopotamia and Egypt) Introduction, page 7
- Reading 1: From The Exact Sciences in Antiquity- O. Neugebauer
- Reading 2: From the A'h-mosè or Rhind Papyrus

Second Reading Assignment: Greek Number Theory

- Chapter II (The Rise of Theoretical Mathematics in Ancient Greece) Introduction, page 37
- Biography of Proclus, page 47
- Reading 5: From "The Catalog of Geometers"-Proclus
- Biography of Pythagoras of Samos, page 50
- Reading 7: From Book VII of the Elements: Definitions-Euclid
- Reading 8: From Prior Analytics i.23 (Irrationality of the Square Root of 2)-Aristotle
- Reading 10: From Commentary on Ptolemy's Harmonics (Arithmetic, Geometric and Harmonic Means)-Porphyry
- Reading 30: From Book VII of the Elements: Propositions 1 and 2 (Euclidean Algorithm)
- Reading 15: From Elements X. Scholium (The Irrational or Incommensurable)-Euclid
- Reading 16: From Elements X. Definitions-Euclid
- Reading 31: From Book IX of the Elements: Propositions 14 (Fundamental Theorem in the Theory of Numbers), 20 (Infinitude of Primes), and 25-30

Third Reading Assignment: Greek Geometry

- Chapter III (Mathematics in the West During Hellenistic and Roman Times) Introduction, page 91
- Reading 12: From Commentary on Euclid i (Sum of the Angles of a Triangle)-Proclus
- Biography of Euclid, page 109
- Reading 27: From Book I of the Elements: Definitions, Postulates, Axioms, and Propositions 1-13
- Reading 28: From Book I of the Elements: Propositions 27-32 (Theory of Parallels)
- Reading 29: From Book I of the Elements: Proposition 47 (Pythagorean Theorem)-Euclid
- Biography of Hippocrates, page 58
- Reading 17: From Commentary on Aristotle's Physics A 2-Philoponus
- Reading 18: From Commentary on Aristotle's Physics A 2 (Quadrature of Lunules)-Philoponus (To the end of the left hand side of page 60)

Fourth Reading Assignment: Method of Exhaustion

- Biography of Eudoxus, page 74
- Reading 32: From Book X of the Elements: Propositions 1-3
- Reading 23: From Book XII.2 of the Elements (Method of Approximation, the So-called Method of Exhaustion)-Euclid
- Biography of Archimedes, page 131
- Reading 33: From Sphere and Cylinder I: Greeting and Assumptions-Archimedes
- Reading 34: From Sphere and Cylinder I: Propositions 33 and 34 (Surface and Volume of a Sphere)-Archimedes
- Reading 35: Measurement of a Circle: Propositions 1-3 (Approximation of Pi Using in Essence Upper and Lower Sums)-Archimedes
- Reading 36: From Quadrature of the Parabola: Introduction and Propositions 17-24-Archimedes

Fifth Reading Assignment: Beginnings of Trigonometry

- Biography of Ptolemy, page 166
- Reading 44: From the Syntaxis or Almagest i (Trigonometry: Table of Sines)-Claudius Ptolemy
- Reading 7.B1, page 245 of The History of Mathematics: A Reader, ed. John Fauvel and Jeremy Gray, Regiomontanus on Triangles (PDF file)

Sixth Reading Assignment: Arabic Algebra

- Chapter IV (Arabic Primacy with Chinese, Indian, and Maya Contributions) Introduction, page 177
- Biography of al-Kwarizmi, page 199
- Reading 47: From The Book of Algebra and Almucabola (Quadratic Equations in Algebra: Verbal Form)-al-Kwarizmi
- Biography of Umar al-Khayyami, page 204
- Reading 48: From the Algebra-Umar al-Khayyami (just up to end of page 208). Look carefully at the end notes!

Seventh Reading Assignment: European Algebra

- Biography of Cardano, page 261
- Reading 56: From the Ars Magna-Girolamo Cardano
- Biography of Viète, page 267
- Reading 57: From In artem analyticen isagoge (The New Algebra)-François Viète
- Chapter VI (The Scientific Revolution at Its Zenith 1620-1720) Introduction, page 291
- Biography of Descartes, page 326
- Reading 62: From La Geometrie (Theory of Equations)-René Descartes
- Reading 63: From La Geometrie (The Principle of Nonhomogeneity)-René Descartes

Eighth Reading Assignment: Birth of Calculus

- Reading 69: From "On the Transformation and Simplification of the Equations of Loci" (Integration)-Pierre de Fermat
- Reading 70: From "On a Method for the Evaluation of Maxima and Minima"-Pierre de Fermat
- Biography of Leibniz, page 383
- Reading 72: From "A New method for Maxima and Minima as Well as Tangents, Which is Impeded Neither by Fractional Nor by Irrational Quantities, and a Remarkable Type of Calculus for This"-Gottfried Wilhelm Leibniz
- Reading 73: From "Supplementum geometriae dimensoriae. . ." in Acta Eruditorum (The Fundamental Theorem of Calculus)-Gottfried Wilhelm Leibniz
- Biography of Newton, page 395
- Reading 74: From Specimens of a Universal [System of] Mathematics-Isaac Newton
- Reading 75: From a Letter to Henry Oldenburg on the Binomial Series (June 13, 1676)-Isaac Newton
- Reading 76: From a Letter to Henry Oldenburg on a General Method for Finding Quadratures (October 24, 1676)-Isaac Newton
- Reading 77: From Principia Mathematica (Prime and Ultimate Ratios: The Theory of Limits)-Isaac Newton (stop after Corollary of Lemma IV and begin again on page 410 after it reads "[Text is omitted here.]" . Then read to the end.)
- Reading 78: From the Introduction to the Tractatus de quadratura curvarum-Isaac Newton

2. Include a new “Statement Concerning Departmental Responsibility”.

MATH 350 Statement Concerning Departmental Responsibility

The Mathematics Department Chairperson will have the responsibility to assure that MATH 350 History of Mathematics is taught in a manner consistent with the writing-intensive course designation and description. The Mathematics Department Chairperson will be responsible for assigning the course to Mathematics faculty members who are aware of the nature of writing intensive courses and committed to integrating writing into the course content.

In general the course will be assigned only to Mathematics faculty who have completed the annual writing workshop offered by the Liberal Studies Committee or a different workshop approved by the Chairperson. However, in the case when this is not possible, the Chairperson will be responsible for assuring that the faculty member is committed to writing as an element in learning mathematics and is aware of various approaches to integrate writing into mathematics courses. This will be achieved by requiring the faculty member to have read at least the articles 1, 2, 3, 4, 6, 7, 11 from the book **Writing to Learn Mathematics and Science** edited by Paul Connolly and Teresa Vilardi (in the IUP Library), Chapters 1-6 in **Writing in the Teaching and Learning of Mathematics** by John Meier and Thomas Rishel (in the IUP Library), and Chapters 1-9 in **Using Writing to Teach Mathematics**, edited by Andrew Sterrett (available in the Chairperson’s Office).

In addition, the Chairperson will provide the faculty member with a copy of the sample syllabus with its included writing assignment examples.