

13-172a.

LSC: App-3/13/14

UWUCC: App-4/1/14

Senate: App-4/29/14

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 271 Introduction to Mathematical Proofs I

Please provide answers to these questions on the next page:

Received

MAR 11 2014

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 Schmitt</i>	4/1/14

TYPE II DEPARTMENT COMMITMENT

Professor Dr. Gary Stoudt Department Mathematics Department

Course MATH 271

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

MATH 271 Introduction to Mathematical Proofs I

Fall, 2013

(writing intensive course)

Prerequisite: MATH 121 or 125; MATH 171

Instructor: Dr. Gary Stoudt

Text: *Mathematical Proofs: A Transition to Advanced Mathematics*, 3rd ed., by Chartrand, Polimeni, Zhang, Pearson, 2013 [This is the same book we will use in MATH 272.]

Office/Phone: 314 Stright/724-357-4764

E-mail: Gary.Stoudt@iup.edu

Office Hours: M 9:00-10:00, T 9:00-10:00, W 1:15-2:15, Th 10:00-11:00, F 9:00-10:00

Course Description (Undergraduate Catalog)

Gives basic ideas necessary to prove results in mathematics. Includes but is not limited to logic of mathematics, basic methods of proof, algebra of sets, equivalence relations and partitions of sets, functions, and mathematical induction.

About the Course

This course marks the beginning of your study of theoretical mathematics. It is probably unlike any other mathematics course you have taken. The goal is not to “get the right answer.” The goal is to write a coherent argument so that you can convince the reader of the truth of your statements and the validity of your argument.

Course Objectives:

Students will:

- recognize and utilize methods of proof – including direct proof, proof by contrapositive, proof by contradiction, proof by cases, and proof by mathematical induction;
- improve logical and critical thinking;
- improve written and oral communication skills in the context of mathematical discourse;
- improve comprehension of mathematical theory;
- learn to write proofs using proof structure: learn to say what they will prove and how, learn to supply a string of logical deductions with justification, learn to summarize what was proved;
- will learn to polish proofs;
- learn to read and find flaws in proofs, and to recognize gaps in reasoning in proofs;
- become more active in the culture of mathematics.

Grading:

Your grade will be based on homework, quizzes, writing assignments (explained later), tests and a cumulative final exam. Assignments may be worth different amounts based on difficulty and length. Much of the homework will be written proofs, or writing assignments. These will be graded for both content and style.

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 to this scale; that is, you may receive a higher grade than indicated if circumstances warrant.

Homework, writing assignments, and tests are fairly self-explanatory. We will have frequent quizzes on definitions and theorems. You cannot write proofs if you do not know your definitions. Not keeping up on theorems and definitions is the easiest way to fail the course! For example, if we are trying to prove a theorem about continuous functions, and you do not know the precise definition of "continuous function," you have no hope of doing a proof.

Writing proofs is not like working an algebra problem. You will not only be graded on correctness, but for readability, coherence and logical thought. Most of your assignments will be made up of proofs or short reaction papers. Writing assignments with few mathematics symbols must be typed and double spaced on standard paper. Proofs and assignments with a significant amount of mathematical symbols may be hand written, but in MATH 272 you will be required to type some assignments so that you learn how to typeset mathematics. You may want to practice in MATH 271.

Attendance Policy:

Class attendance 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 the questions and comments that do not appear in your textbook. Students who miss class quickly lose the "benefit of the doubt" that I sometimes give students. With this in mind this class has the following policies.

Absence from a test or the final exam that is not cleared with me beforehand will result in a score of zero.

Homework is due at the beginning of the class period, unless cleared with me beforehand. Any homework not turned in on time will receive a zero score. You may turn an assignment in early or have someone turn it in for you at the beginning of class. You are responsible if this person does not turn your assignment in on time.

Statement of Academic Honesty:

Any work that you turn in to me is for a formal evaluation; the work you do on this work must be your own. Students may confer with each other about assignments, but only to discuss ideas, not specifics. Writing should not be exchanged in any way, either by paper, board work, e-mail, or any other means. Your name on an assignment is your guarantee that the work is completely your own. **Homework is not a group assignment and I will not tolerate plagiarism on homework!** During tests, no unauthorized information can be used.

Course Topics

1. Sets

Set Notation, Subsets, Set Operations, Cartesian Products

Test #1

2. Logic

Statements and Open Sentences, Negation, Disjunction and Conjunction, Implications, Biconditional, Tautologies and Contradictions

Test #2

3. Direct Proof and Proof by Contrapositive

Vacuous Proof, Direct Proof, Proof by Cases, Proof by Contrapositive

4. Topics for Proof

Divisibility, Congruence Modulo n , Real Numbers, Set Operations

Test #3

5. Proof by Contradiction

6. Mathematical Induction

Sample Writing Assignments

Informal Writing

Why Did You Choose to Study Mathematics?

How Do You Best Learn Mathematics?

What is the Purpose of Homework?

Culture Points

Writing for an Audience

Student Interchange of Class Notes

Explain Negating Quantified Statements

Finding Calculus Proofs and Discussing the Proof Technique Used

Formal Mathematical Writing

Mathematical Proof Writing

Proofs in Paragraph Form

Side by Side Proofs Using Mathematical/Logical Symbols and Using Only Words

Finding and Correcting Flaws in Proofs (Editing)

Proof Portfolio

Culture Points*

In this class you will be expected to accumulate 12 “culture points.” The goal of these culture points is to integrate you into the mathematics culture/community.

Each item includes participating in a mathematical activity and a write-up of the activity.

Attend a talk hosted by the Mathematics Department	4 points
Attend a talk with a mathematical component hosted by another department	4 points
Read a mathematics article	4 points
Read an article about mathematics, not teaching, in <i>The Mathematics Teacher</i>	3 points
Discussing or Doing mathematics (outside of classwork)	2 points
Finding mathematics in the news or news magazines	2 points
Reading a general interest mathematics article	2 points
Finding mathematics in popular culture	1 point
Anything else you think up	see me

Write-up

The culture points write-up must include a summary of the activity and your reflection on the mathematics involved in the event. This should be about one page, with the majority of the write-up focusing on your reflection, not the summary. If you read an article, include a bibliographic reference.

Your culture point score will be prorated based on 50 points (half a test or a large homework assignment). That is, if you accumulate 12 or more culture points you will receive 50/50. If you accumulate 8 culture points you will receive 33/50 [$8/12$ times 50], and so on. There is no extra credit for accumulating more than 12 culture points.

You may only submit one write-up per class period. This will ensure that you do not try to hand in all your write-ups at once (for example on the last day of class).

Where can I find out about talks?

These are usually posted in Stright Hall, announced in math classes, or in the department news on our web page: <http://www.iup.edu/math>.

Where can I find mathematics articles?

The Pi Mu Epsilon Journal, past issues at <http://www.pme-math.org/journal/issues.html>

The Pentagon, published by Kappa Mu Epsilon, past issues at http://www.pentagon.kappamuepsilon.org/Pentagon_Issues.php

The Mathematics Teacher, past issues at <http://www.jstor.org/action/showPublication?journalCode=mathteacher>
(from on campus only)

The American Mathematical Monthly, *The College Mathematics Journal*, *The Two-Year College Mathematics Journal*, *Mathematics Magazine*, *The Mathematical Gazette*

Available through the IUP Library: <http://www.iup.edu/library>

1. Click on "Article Databases" under "Find Information."
2. Click the letter J in the index at the top of the screen.
3. Scroll down to JSTOR. Click on it (or the "off campus" link if you are off campus)
4. At the top of the page choose BROWSE, then by Publisher.
5. Click on the Journals tab.
6. Click on the letter M in the index at the top of the screen.
7. Scroll down to Mathematical Association of America

DO NOT pay for any articles. If it asks you to pay, that means you are not logged in. Click the login button on JSTOR and choose Login via an institution. This will use your IUP Web Single Sign-On Login.

There are plenty of other journals if you want to browse, but the ones I list have articles that you should be able to understand.

Where can I find general interest mathematics articles?

In many places, but good sources are:

- The Mathematical Association of America (MAA) website: <http://www.maa.org>. Click on "News."
- The American Mathematical Society (AMS) website: <http://www.ams.org>. Click on "Math Samplings" or "News."
- The Society for Industrial and Applied Mathematics (SIAM) website: <http://www.siam.org>.
- The Institute for Operations Research and the Management Sciences (INFORMS) website: <https://www.informs.org/>. Click on "In the Media."

The American Statistical Association (ASA) website: <http://www.amstat.org/>

*Michael Fraboni and Kevin Hartshorn. Culture Points: Engaging Students Outside the Classroom, PRIMUS, 17:2 (2007), 117-124.

Proof Portfolio

In this class you will be assembling a "Proof Portfolio." This portfolio will contain selected proofs from each chapter. Proofs chosen to be in the portfolio must be formally written and typeset mathematically. The final portfolio will consist of the typeset proofs and **one** electronic file containing all the proofs. You hand in a paper copy and the file.

You will have three chances to hand in each proof for the portfolio before the entire portfolio assignment is due.

The first time is when the assignment containing the proof is due. For example, if the proof chosen for the portfolio is from section 3.1, then the first submission is due when the 3.1 problems are due. The first attempt does not need to be mathematically typeset.

The second time is up to one week after the graded assignment is returned. The second attempt must be mathematically typeset.

The third time is up to one week after the second draft is returned. The third attempt must be mathematically typeset.

You are responsible for keeping track of due dates.

The final proof portfolio will be graded on:

1. correctness of the proof,
2. style of the proof,
3. proper typesetting (yes, there is good and bad typesetting).

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

MATH 271 Statement Concerning Departmental Responsibility

The Mathematics Department Chairperson will have the responsibility to assure that MATH 271 Introduction to Mathematical Proof I 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 Vilaridi (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.

For reference, here is the current official Statement Concerning Departmental Responsibility that is in the latest syllabus of record for MATH 271 (1997-98).

STATEMENT CONCERNING DEPARTMENT RESPONSEBILITY

The Mathematics/Applied Mathematics Committee will have general responsibility to assure that MATH 271 Introduction to Mathematical Proof I is taught in a manner consistent with the writing-intensive course outline and description.

The Mathematics Department Chairperson, in consultation with the Mathematics/Applied Mathematics Committee, 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 an approved writing workshop. However, in any case that the course is assigned to a faculty member who has not completed a writing workshop, 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. The latter will be achieved by expecting 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.