

# Bethel College

## Syllabus

### MTH561: Real Analysis – Proving Calculus      Fall 2018

#### Face-to-Face Class

Face-to-Face Class: August 28 – December 13, 2018

Class Meeting: Tues 6:00-9:00 P.M.

Instructor:    Dr. Alice A. Ramos  
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### Course Description

A rigorous treatment of the real number system, and the underpinnings of calculus. Topics include: sequences, series, limits, continuity, uniform continuity, uniform convergence, differentiation, Riemann integration, and power series, and the importance of proof in the mathematics classroom.

### Objectives

1. A rigorous treatment of the fundamentals of single-variable calculus;
2. Development and practice of proof techniques common in analysis;
3. Increased ability to articulate mathematical arguments; and
4. Introduction to the elementary aspects of analysis, including function spaces.
5. Exploration of techniques for the integration of proof into AB and BC (or dual credit) Calculus courses.

### Prerequisites

Calculus III (Math 231 or equivalent), graduate standing

### Required Resources

Text: Introduction to Real Analysis, by Robert L. Brabenec, 1990. ISBN: 0534921620

MyBethel and Email: Students are expected to check MyBethel, Canvas and e-mail regularly for course and school related communications. Course resources (syllabus, assignments, etc.) will generally be made available through Canvas.

### Attendance Policy

Excellent attendance is expected. Please contact the instructor (via email) prior to any foreseen absence. Generally, in-class activities cannot be made up and due dates for out-of-class assignments will not be adjusted due to absence. (However, a zero resulting from a missed exam may be replaced by the final exam grade.) In extenuating circumstances, exceptions may be made at the discretion of

## Lecture

The lecture for this class meets one night per week and will be primarily dedicated to going over new material. Your active participation in lecture (taking notes, asking questions, contributing to discussions) is strongly encouraged and expected.

## Course Grades

Your grade will be based on homework (20%), four papers (20%) and three exams (20% each). The grading scale is as follows:

A	93–100	B-	80–82.9	D+	67–69.9
A-	90–92.9	C+	77–79.9	D	62–66.9
B+	87–89.9	C	73–76.9	D-	60–61.9
B	83–86.9	C-	70–72.9	F	0–59.9

## Homework

Homework will be assigned each Tuesday corresponding to the current material, and will be due on Tuesday of the following week. Several problems will be assigned, with particular items to be submitted for grading. For extra credit on homework, students are encouraged to volunteer to present a homework solution in class (details to be provided in class).

Correct use of mathematical symbols and logic is expected. There are frequently several different ways to (correctly) solve a problem or do a proof. Whatever method you use, be sure that it follows logically and always show your work/reasoning.

You are encouraged to work with peers while working on homework and studying. Different perspectives can be helpful! Also, verbalizing/explaining concepts/problems to each other is a great way to verify that you correctly understand material. Although you are encouraged to work with others, your copy of your homework should be completed on your own and in your own handwriting. Please keep in mind that while collaboration is encouraged, copying part or all of another's work is plagiarism. Finding solutions via the internet or published resources and presenting them as your own is also considered plagiarism/cheating. Always give credit where credit is due.

## Papers

You are asked to write four papers over the course of the semester, three pertaining to new strategies you would like to adapt to your calculus classroom, and one in regard to the importance of proof in the mathematics classroom.

- Paper 1-3 – Find three articles (one for each paper) related to teaching various concepts in the calculus classroom. Create a lesson plan for how you might adapt the technique for use in your classroom. Write a (2 page minimum) article summary and reflection. Be sure to address how you adapted the technique and why, and the outcomes you hope to achieve.
- Paper 4 – Write a paper on the importance of proof in the mathematics classroom, specifically in calculus, referencing at least three peer reviewed articles, but also referencing your own opinion on the topic. (4-5 pages in length, double spaced, APA format)

## Exams

There will be three exams, two midterms and a final. The final will include the indicated sections as well as some cumulative material.

- Exam 1 – Sequences and Limits (Sections 1-13): TBA
- Exam 2 – Continuity and Derivatives (Sections 14-22): TBA
- Final Exam – Sequences and Series of Functions (Sections 29-35) : One the last evening of class.

## Cheating/Plagiarism

“Any act of deceit, falsehood or stealing by unethically copying or using someone else’s work in an academic situation is strictly prohibited.

1. A student found guilty of plagiarism or cheating will receive an “F” (zero) for that particular paper, assignment or exam. Should this occur, the professor will have an interview with the student and will submit a written report of the incident to the academic dean.
2. If a second offense should occur, the student will be asked to appear before the professor, the academic dean and the vice president for student development. The student should realize that at this point continuation in a course and even his/her academic career may be in jeopardy. In the event of a recommendation for dismissal, the matter shall be referred to the Student Development Committee.” (Bethel Student Handbook, page 156)

## Cell Phone Policy

Please be sure that cell phones are completely silenced or turned off and stowed out of sight at the beginning of class each day to help minimize class interruptions. Any student using a cell phone (without permission) will be asked to leave the class and an unexcused absence will be recorded. Students using cell phones during graded activities (e.g. exams, quizzes, etc.) may be cited for cheating (at the professor’s discretion).

In the case of expected emergencies, students may seek permission from the professor to leave their cell phones on during class, but the phone must remain stowed out of sight. Professors reserve the right to have operational cell phones in class.

## Students with Disabilities Policy

In accordance with the provision of the Americans with Disabilities Act, if you require any special assistance or adaptations in this course, please contact the professor immediately.

Students with disabilities are requested to contact the Office of Academic Support to complete the intake process and determine their eligibility for reasonable accommodations. These arrangements should be made well in advance of the first course exam.

## Disclaimer

This syllabus is not a legal contract, but serves as a general outline for the semester. The professor reserves the right to make adjustments to the course as the need arises.

*Forward, with Christ at the helm!*

*For by him were all things created, that are in heaven, and that are in earth, visible and invisible, whether they be thrones, or dominions, or principalities, or powers: all things were created by him, and for him: And he is before all things, and by him all things consist.* — Colossians 1:16-17 KJV

*While we look not at the things which are seen, but at the things which are not seen: for the things which are seen are temporal; but the things which are not seen are eternal.* — 2 Corinthians 4:18 KJV

*Study to show thyself approved unto God, a workman that needeth not to be ashamed, rightly dividing the word of truth* — 2 Timothy 2:15 KJV

*Therefore we also, since we are surrounded by so great a cloud of witnesses, let us lay aside every weight, and the sin which so easily ensnares us, and let us run with endurance the race that is set before us, looking unto Jesus, the author and finisher of our faith, who for the joy that was set before Him endured the cross, despising the shame, and has sat down at the right hand of the throne of God.* — Hebrews 12:1-2 NKJV