‘Math291 A History of Infinity Fall 2013

Instructor: Fred Schultheis
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Office hours: MW 11:30 am -1:00 pm and by appointment

Text: Infinity and the Mind: The Science and Philosophy of the Infinite, Rudy Rucker

Required Readings: (All are on reserve in Reeves Library)

George Berkeley, The Analyst*

David Hilbert, On the Infinite

Several short stories by Jorge Luis Borges that deal with infinity such as

The Avatar and the Tortoise, The Book of Sand, The Library of Babel, and Funes*

Excerpts from:

Aristotle, Physics

Bernard Bolzano, Paradoxes of the Infinite

Giordano Bruno, On the Infinite Universe and Worlds*

Georg Cantor, Contributions to the Founding of the Theory of Transfinite Numbers

Galileo Galilei, Two New Sciences

Bertrand Russell, *The Problem of Infinity Considered Historically*

St. Augustine. The City of God

* These writings are also available, free of charge, online.

Suggested Readings: (All are on reserve in Reeves Library except the last which is an ebook available through Reeves Library)

The Quest to Think the Unthinkable by Brian Clegg

The Art of the Infinite : The Pleasures of Mathematics by Robert Kaplan and Ellen Kaplan

Understanding the Infinite by Shaughan Lavine

The Infinite by A. W. Moore

Zero: The Biography of a Dangerous Idea by Charles Seife

In Search of Infinity by N. Ya. Vilenkin

The Infinite Book [electronic resource] : a short guide to the boundless, timeless, and endless by John D. Barrow

Some interesting webpages:

http://www-history.mcs.st-and.ac.uk/history/HistTopics/Infinity.html
http://www.ccs3.lanl.gov/mega-math/workbk/infinity/infinity.html
http://www.ccs3.lanl.gov/mega-math/workbk/infinity/inhotel.html
http://www.newadvent.org/cathen/08004a.htm
http://www.mathacademy.com/pr/minitext/infinity/
http://pespmc1.vub.ac.be/INFINITY.html
http://scidiv.bcc.ctc.edu/Math/infinity.html

Course Content

This course is a blend of mathematics and philosophy, tracing the history of the concept of infinity from Pythagoras to Georg Cantor. We will investigate several paradoxes of infinity as well as the ultimate questions; is anything in the real world infinite? Is space or time? Is space or time discrete? Are they continuous? What is the significance of the answers of these questions to the modern view of the universe? Students will read and discuss some of the great mathematician's and philosopher's ideas and solutions to these paradoxes and questions. They will be required to express and defend their own beliefs in class and graded writing assignments.

Course Goals

Through investigating the development of the concept of infinity students should develop an ability to analyses, discuss, and develop their own views on the type of ultimate questions raised in the previous paragraph. They should come to understand the significance of these questions and gain an appreciation for the beauty and utility of mathematics and its historical development.

Assignments

Mathematics can only be understood by consistent study and problem solving. For this reason, daily reading and problem assignments will be given and you are expected to have these assignments completed for the next class. You will be called on to give solutions in class, and also are expected to participate in class discussions, ask questions about what you did not understand, and express and defend your own views on the concepts discussed in class.

Grading

Your course grade will be based on class participation (50 points), several short papers (100-150 points)total, 2-3 hourly exams (100 points each), and a comprehensive final exam (200 points). **The final exam is scheduled for Monday, December 9, 2013 at 1:30.**The following grading scale is used for assigning your final grade.

A	$93-100$	$C-$	$70-72$
$B+$	$86-89$	$D+$	$66-69$
B	$83-85$	D	$63-65$
$B-$	$80-82$	$D-$	$60-62$
$C+$	$76-79$	F	≤ 59
C	$73-75$		

I reserve the right to include pop quizzes as a part of your final grade if I feel that the class is not doing the reading assignments.

Attendance

Class attendance is required. You will lose 10% from your class participation grade for each unexcused absence. If you are sleeping in class, you are not there. If you feel the need to leave class before it is over, even if you come back, you are not there. In other words, in any of these cases you will be considered absent

and will lose 10% of your class participation grade. You are responsible for all work covered in class and all assignments, even if absent from class. If you must miss more than one class due to illness or emergency, you should notify the instructor. There will be no make-up for missed quizzes. Make-up tests are given only in extreme cases. If a student has to miss a test it is the student's responsibility to contact the instructor as early as possible.

Learning Disability Accommodations

Students who wish to request accommodations in this class for a disability should contact Mr. Joe Kempfer, Assistant Director of Learning Services for Disability Support, 1307 Main Street (extension 1510). Accommodations cannot be provided until authorization is received from the office of Learning Services.

The following Academic Honesty Policy Guidelines are to be followed. Please read them carefully.

ACADEMIC HONESTY POLICY GUIDELINES FOR MATHEMATICS COURSES

The Mathematics and Computer Science Department supports and is governed by the Academic Honesty Policy of Moravian College as stated in the Moravian College Student Handbook. The following statements will help clarify the policies of members of the Mathematics faculty.

In all homework assignments which are to be graded, you may use your class notes and any books or library sources. When you use the ideas or thoughts of others, however, you must acknowledge the source. **For graded homework assignments, you may not use a solution manual or the help, orally or in written form, of any living being other than your instructor.** If you receive help from anyone other than your instructor or if you fail to reference your sources you will be violating the Academic Honesty Policy of Moravian College. For homework which is not to be graded, if you choose, you may work with your fellow students. You are responsible for understanding and being able to explain the solution of all assigned problems, both graded and ungraded.

All in-class or take-home tests and quizzes are to be completed by you alone without the aid of books, study sheets, or formula sheets unless specifically allowed by you instructor for a particular test.

I reserve the right to alter this syllabus at anytime, provided that I inform you in writing of any such alteration.