CO 480 Course Outline – Spring 2017

Overview

This course will examine a few of the people, places and problems that are historically significant in mathematics, specifically in the area of number theory. The course is taught through a series of vignettes complemented with readings. Each of the vignettes looks at a particular person working on a particular problem in a particular historical and geographical place. There will, of course, be many connections to other people, other problems and other places.

Hopefully, this story telling approach will illuminate the interactions between mathematics and society in the past, in the present, and in your experience.

Section and Instructor Information

Section 001, 2:30 - 4:00 TTh, MC 4059
Carmen Bruni, MC 6226, cbruni@uwaterloo.ca
Websites:

- `http://www.cemc.uwaterloo.ca/~cbruni/CO480Resources/index.php`

- `https://piazza.com/`

- `https://learn.uwaterloo.ca/`

Office Hours: By appointment.

Course Website

In this course, we will use LEARN, Crowdmark, Piazza and a public website.

- All content related to the course lectures will be on the public website stated above.

- All content relating to grading (assignments, projects, quizzes, etc.) will be on LEARN.

- All non-personal questions should be posted on Piazza.

- All homework submissions will be done on Crowdmark (and LEARN for some portions of the project - see below).

Textbook

No textbook will be formally required.

Course Work

The course work to be submitted is in three parts: four assignments, four in-class quizzes, and a project based on a mathematician born after 1600. There is no midterm test and no final exam.

Assignments 20% Assignments have two parts. The first part consists of brief historical essays. Marks will be awarded for quality and detail of historical information, and for quality of exposition. The second part is a collection of mathematical problems. There are four assignments each worth 5%. These will be submitted via Crowdmark. The solution to each question must be scanned and uploaded to the appropriate question. In order to receive a graded, submissions **must be uploaded to the correct questions in the proper orientation**. Submissions **must be double checked on a computer to ensure orientation is valid and is legible**. A computer is a desktop or laptop computer **and does not include tablets, cell phones, or any device in which "right-side up" might be an issue**. You will receive a link from Crowdmark according to the schedule below. **If you enroll late or do not receive a link on the date below, you must email your instructor for a link**. It is YOUR responsibility to ensure you have your Crowdmark link before the due date (check on Piazza for a link announcement). Do NOT share Crowdmark links! All assignments are due at 2:30pm on their respective due dates.

Quizzes 20% There will be two 80 minute quizzes on June 6th and July 25th that will cover both the history portion of the course and the mathematics of the course. Both will be very straightforward. Each quiz is worth 10%. You must pass the total average of the quizzes to pass the course. You must write at least 1 of the 2 to pass the course and quizzes that are missed must be accompanied by valid documentation (eg. a doctor's note). The first half of the alphabet will write in MC 4059 and the second half of the alphabet will write in MC 4061 (check Piazza for a formal announcement when the time comes).

Project 60% The project will be modelled on the vignettes presented in class. Each vignette will have three components. The first component is a description of the *place*, the geographical and historical setting. The second component is a description of the *person*, a biography of your chosen mathematician. The final component is a mathematical exposition of a *problem* related to the person and place. The project can be done in groups of size one to four. The size of the project should be about 16-20 pages (excluding title pages, table of contents, and bibliography). **The assignment must be done using LaTeX** (please see the CO 480 resources page for a primer). The vignette will be submitted in five parts:

1. The *Project Outline* identifies the group members, the person, the place and the problem. You will be asked to provide a detailed outline and identify source material. Each group member will submit this on Crowdmark (you should all submit the same file). (2%)

2. The *Annotated Bibliography* provides content summaries of at least five refereed or five edited sources. Each group member will submit this on Crowdmark (you should all submit the same file). (8%)

3. The *First Edition* is a complete version of your project. No quizzes or assignments are due during the week prior to the deadline. A second, revised edition will be required later. Use the quality of the course mini-documentaries and textbook prose as standards. For detailed expectations see the document *Project_Marking_Scheme.pdf*. Some sample projects are available on LEARN. You will submit two versions (one with your names and one without your names for anonymity purposes below). This will be submitted using LEARN's Dropbox feature. (25%)

4. The First Edition will be randomly and anonymously distributed to other students in the class. You will be expected to edit the writing, verify the mathematics and fact-

check the history. Expectations are contained in the document *Editorial_Guidelines.pdf*. Marks will be assigned for the quality of editing. Your editorial remarks will be returned, anonymously, to the authors. This will be submitted using both Crowdmark (for grades) and LEARN's Dropbox feature. (15%)

5. The *Final Edition* should take into account editorial suggestions, additional research and your own revisions. This will be submitted using LEARN's Dropbox feature. (10%)

On submitting the project, you allow its future use by the University of Waterloo, with credit given to your group. **Late submissions will not be accepted.** You are **not** allowed to select a mathematician that is in the syllabus below.

TurnItIn

Plagiarism detection software (Turnitin) will be used to screen assignments in this course. This is being done to verify that use of all materials and sources in assignments is documented. If you do not want your assignments screened by Turnitin, you will be given an alternative option. In the first week of the term, details will be provided about arrangements and alternatives for the use of Turnitin in this course.

Cheating Policy

The reputation of the University and the integrity of your degree rests on the assumption that all work submitted is your own. Discussion related to the assignments is acceptable and encouraged, but you are expected to write up the assignments on your own. Copying or paraphrasing a solution from some fellow student or old solutions qualifies as cheating.

All students suspected of cheating will automatically be referred to the Undergraduate Associate Dean. Students who are unsure whether an action constitutes an offence, or who need help in learning how to avoid offences should seek guidance from the instructor. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Academic Discipline, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy 70 Student Grievance, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm.

Syllabus

The syllabus below is subject to change at the instructor's discretion but gives a rough outline of what will be covered and when.

	Date	Topic	Posted	To Be Handed In	Weight
1	Tuesday May 2nd	Introduction and William Tutte	Assignment 1		
2	Thursday May 4th	William Tutte and Cryptography			
3	Tuesday May 9th	Diophantus and Diophantine Equations			
4	Thursday May 11th	Diophantine Equations			
5	Tuesday May 16th	Brahmagupta, Bhaskara and Pell's Equation	Assignment 2	**Project Proposal**	2%
6	Thursday May 18th	Pell's Equation		**Assignment 1**	5%
	Tuesday May 23rd	**MONDAY SCHEDULE! NO CLASS.**			
7	Thursday May 25th	Guest - Alain Gamache - Mathematics of Antiquity			
8	Tuesday May 30th	Guest - Alain Gamache - Mathematics of Antiquity		**Annotated Bibliography**	8%
9	Thursday June 1st	Guest - Alain Gamache - Mathematics of Antiquity		**Assignment 2**	5%
10	Tuesday June 6th	In Class Quiz (2:30 - full 80 minutes)	Assignment 3	**In Class Quiz 1**	10%
11	Thursday June 8th	Cardano, Viète, Tartaglia, Ferrari			
12	Tuesday June 13th	Cardano's Formula			
13	Thursday June 15th	Mersenne and Fermat			
14	Tuesday June 20th	Fermat's Last Theorem (and other problems)		**First Edition**	25%
15	Thursday June 22nd	Euler and Revisit Fermat's Last Theorem	Assignment 4		
16	Tuesday June 27th	Euler and Revisit Fermat's Last Theorem		**Assignment 3**	5%
17	Thursday June 29th	Sophie Germain			
18	Tuesday July 4th	Legendre and the Legendre Symbol			
19	Thursday July 6th	Legendre and the Legendre Symbol		**Editorial Review**	15%
20	Tuesday July 11th	Gauss and Quadratic Reciprocity			
21	Thursday July 13th	Gauss and Quadratic Reciprocity			
22	Tuesday July 18th	Andrew Wiles, EC FLT			
23	Thursday July 20th	Elliptic Curves and Fermat's Last Theorem		**Assignment 4**	5%
24	Tuesday July 25th	In Class Quiz (2:30pm - full 80 minutes)		**In Class Quiz 2**	10%
				Final Edition	10%