MATH 312   Elementary Number Theory   Sep. 2022

Instructor: Dragos Ghioca, dghioca@math.ubc.ca.
Lectures: MWF 11:00 - 11:50
Course available on CANVAS
Office hours: Tu 12:00 - 12:50 & Th 15:00 - 15:50, ONLINE (ZOOM link available on CANVAS)

Course outline: We will cover selected topics from Chapters 1-9 of the optional textbook **but the order of covering the topics might be different during the course. I strongly encourage you to follow my lecture notes which show what will be covered each class.**

1. Divisibility, primes.

2. Congruences, Chinese Remainder Theorem, Hensel's Lemma.

3. Fermat's Little Theorem, Euler's Theorem, Wilson's Theorem.

4. Quadratic Residues, Quadratic Reciprocity, Sums of squares, Primitive roots.

5. Arithmetic functions

6. Various applications of congruences and divisibilities.

Text (optional): "Elementary Number Theory and its applications" by Kenneth H. Rosen. However, *any other introductory textbook to Number Theory* (the library has several such books) would be suitable. **Extensive lecture notes are available online on CANVAS. It is recommended you follow closely my lecture notes and preferably, read the material ahead of each class.**

Learning goals: The students are expected to learn the following, which also includes being able to solve questions combining all of these topics:

- the Fundamental Theorem of Arithmetic;

- properties of congruences;

- Fermat's Little Theorem and Euler's Theorem;

- important multiplicative functions;

- properties of the primitive root corresponding to a given moduli.

Evaluation: The final mark will be based on 9 homework assignments due online through CANVAS on September 16, September 23rd, October 7, October 14, October 28th, November 4, November 18th, November 25th and December 5.

Course Policies:

1. **Students experiencing symptoms of Covid-19 should not attend class**. Instead those students should consult the extensive online lecture notes and also attend the online office hours.

2. **Missing homework:** If you miss the homework's deadline, there is no make-up homework and you will receive a mark of 0 points for the missed homework assignment unless there is a valid reason for missing this homework. Any student who misses the homework assignment should send me an email containing a completed Department of Mathematics self-declaration form (available on CANVAS) for reporting a missed assessment within 72 hours of the due date for the assignment. **In the case of one missed assignment for a valid reason, at the end of the semester, that assignment will be awarded the average mark of the submitted assignments. For the second missed assignment with a valid reason, at the end of the semester, that assignment will be awarded the lowest mark among the submitted assignments. For a third or any additional missing assignments, regardless of reason for missing those assignments, those assignments will receive 0 marks.**

Academic Misconduct:

1. UBC takes cheating incidents very seriously. After due investigation, students found guilty of cheating on tests and examinations are usually given a final grade of 0 in the course and suspended from UBC for one year.

2. While students are encouraged to study together, they should be aware that blatant copying of another student's work is a serious breach of academic integrity. Please discuss with your instructors their expectations for acceptable collaboration on any assigned coursework. Cases of suspected cheating will be investigated thoroughly.

3. Note that academic misconduct includes misrepresenting a medical excuse or other personal situation for the purposes of postponing an examination or quiz or otherwise obtaining an academic concession.

Statement on UBC's Policies and Resources to Support Student Success:

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available at

https://senate.ubc.ca/policies-resources-support-student-success

The instructor reserves the right to change this course outline at any time during

the semester.