

## Mathematics 3200H – Number Theory

TRENT UNIVERSITY, Fall 2022

[In Peterborough!]

### Instructor

Stefan Bilaniuk (pronounced Стефан Біланюк)

office: ENW 337

hours: Tuesday, Wednesday, & Thursday 11:00-11:50,  
also by appointment, or just drop in.

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### Department of Mathematics

Colleen Berrigan

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### Prerequisite

MATH 1350H and MATH 2200H.

### Text

*Elementary Number Theory* (2nd Edition), by Underwood Dudley, 1978.

Reprinted by Dover Publications, ISBN 978-0-46931-7.

### Meetings

Lectures: Tuesdays 09:00-09:50 in ESC B319 and Thursdays 08:00-09:50 in OCA 206.

Seminars: Tuesdays 10:00-10:50 in ESC B319.

### Marking Scheme

There will be at least eleven weekly assignments and a take-home final examination. Please consult the schedule below for due dates. The work will weigh as follows:

Best 10 assignments (6.5% each) 65%

Take-home final examination 35%

At least 25% of the course marks will be obtained by the final date (Tuesday, 8 November) to withdraw from Fall courses. Please note that assignments will be accepted after the due date entirely at the instructor's discretion. Students who miss more than one assignment for reasons beyond their control should contact the instructor as soon as possible.

This scheme may be modified for students in exceptional circumstances, such as a lengthy absence due to illness. Any such modification will require the agreement of both the student and the instructor.

### Learning Outcomes

This course is an introduction to elementary number theory. A student successfully completing the course should be able to understand, be able to explain, and be able to prove most results in elementary number theory up to the Quadratic Reciprocity Theorem, as well as do computations using the concepts developed in the course.

### Content & Schedule

We will cover §1–12, 18, and 19 of the textbook. As no lesson plan survives contact with actual students unchanged, please note that where the material covered is concerned the schedule below is a polite fiction: we will adjust the pace and order of the material as necessary.

**Weeks 0–2.** (8-23 September) Classes begin on Thursday, 8 September. §1–5. Natural numbers, integers, unique factorization, linear Diophantine equations, congruences. Assignment #1 due on Friday, 16 September, and Assignment #2 due on Friday, 23 September.

**Weeks 3 & 4.** (26 September – 7 October) §5–7. Chinese Remainder, Fermat’s, and Wilson’s Theorem, divisors. Assignment #3 due on Friday, 30 September, and Assignment #4 due on Friday, 7 October.

**Weeks 5 & 6.** (10-21 October) §7–8. Divisors, perfect and amicable numbers. Assignment #5 due on Friday, 14 October, and Assignment #6 due on Friday, 21 October. *University closed on Monday, 11 October, for Thanksgiving Day.*

**Reading Week.** (24-28 October) Enjoy! Catch-up if necessary, study ahead if you feel like it.

**Weeks 7 & 8.** (31 October – 11 November) §9. Euler’s totient function, Euler’s Theorem. Assignment #7 due on Friday, 4 November, and Assignment #8 due on Friday, 11 November. *The last date to withdraw from Fall courses is Tuesday, 8 November.*

**Weeks 9 & 10.** (14-25 November) §10–12. Primitive roots, quadratic congruences. Assignment #9 due on Friday, 18 November, and Assignment #10 due on Friday, 25 November.

**Week 11 & 12.** (28 November – 7 December) §12 & 18–19. Quadratic reciprocity, sums of squares. Assignment #11 due, and Take-Home Final Examination distributed on Friday, 2 December. *Classes end on Wednesday, 7 December.*

**Fall Examination Period.** (9-22 December) Possible Assignment #12 due on Friday, 9 December. Take-Home Final Examination due on Friday, 16 December.

### Academic Integrity

*Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from a 0 grade on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University’s Academic Integrity Policy. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent’s Academic Integrity website to learn more – [www.trentu.ca/academicintegrity](http://www.trentu.ca/academicintegrity)*

For clarity, the following guidelines will apply in MATH 3200H:

You are permitted and encouraged to work together and ask anyone willing (especially the instructor!) for explanations, hints, and suggestions on the assignments, and to use what software and consult whatever sources you wish. However, **all work submitted for credit must be written up entirely by yourself, giving due credit to all relevant sources of help and information.** The restrictions applicable to the take-home final exam will be spelled out on the exam.

### Access to Instruction

*It is Trent University’s intent to create an inclusive learning environment. If a student has a disability and/or health consideration and feels that he/she may need accommodations to succeed in this course, the student should contact the Student Accessibility Services Office (SAS), Blackburn Hall Suite 132, 705 748-1281, [sas@trentu.ca](mailto:sas@trentu.ca). For Trent University in Oshawa Student Accessibility Services Office contact 905 435-5102, ext. 5024. Complete text can be found under Access to Instruction in the Academic Calendar.*

### Archive Page

A web page at [euclid.trentu.ca/math/sb/3200H/](http://euclid.trentu.ca/math/sb/3200H/) archives material from a previous iteration of this course taught by the instructor. Material from this iteration will be posted there too, as well as on Blackboard,

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