Mathematics 2260H – Geometry I: Euclidean geometry

TRENT UNIVERSITY, Fall 2015 *[In Peterborough!]*

Instructor

Stefan Bilaniuk (pronounced Стефан Біланюк)

office: GCS 337

Fall hours: Tuesday–Friday 10:00-10:50,
  or by appointment, or just drop by!

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[E-mail sent to my Trent address sometimes just vanishes. If it's important, please send it to sbilaniuk@gmail.com as well.]

Department of Mathematics

office: GCS 346

hours: 08:30-12:30 & 13:30-16:30

phone: 705 748-1011 x7531

e-mail: math@trentu.ca

Prerequisite

60% or higher in MATH 1005H or 1100Y or 1101Y or 1120H or 1350H; or permission of instructor.

Text

Geometry from Euclid to Knots, Saul Stahl, Dover Publications, Inc., 2010. ISBN-10: 0-486-47459-3, ISBN-13: 978-0-486-47459-5.

You may also find the following books to be of interest and possibly useful:

Euclid's Elements of Geometry, in Greek, edited and translated into English by Richard Fitzpatrick, 2008. ISBN-13: 978-0-6151-7984-1. Free e-text at: farside.ph.utexas.edu/euclid.html

The Foundations of Geometry, David Hilbert, translated into English by E.J. Townshend, 1902. Free e-text at: www.gutenberg.org/etext/17384

Other freely available sources may be used to augment those above in the latter half of the course.

Meetings

Lectures: Monday 09:00-10:50 GCS 106 and Thursday 13:00-13:50 in SC 115.

Seminar: Tuesday 18:00-18:50 in GCS 106.

Marking scheme

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

Best 10 quizzes (3% each)	30%
Best 5 assignments (7% each)	35%
Final Examination	35%

At least 25% of the course marks will be obtained by the final date (Tuesday, 10 November, 2015) to withdraw from Winter half-courses without academic penalty. Please note that assignments will not normally be accepted after the due date. Students who miss more than one quiz or assignment for reasons beyond their control should contact the instructor as soon as possible.

This scheme may also be modified for individual 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.

Content & Learning Outcomes

MATH 2260H is an introduction to Euclidean plane geometry, starting from Euclid's axioms and developing properties of lines, angles, polygons, and circles. Successful students will acquire knowledge of and the ability to use results concerning congruence, similarity, cross-ratios, concurrency, and collinearity, including the Butterfly, Ceva's, Menelaus', and Pappus' Theorems, and develop some of the relationships between triangles and circles, up to and including the nine-point circle. Other topics in geometry may be touched on from time to time. Note that acquiring familiarity and comfort with doing proofs is necessary in this course.

Schedule

Please note that where the material covered is concerned, the schedule below is a polite fiction: no lesson plan survives contact with actual students unchanged!

Week 0. *(10-11 September)* Organizational lecture. *Classes begin Thursday, 10 September.*

Week 1. *(14-18 September)* §1.1–1.3, 2.1–2.2, Appendix E: Some examples of geometries; Euclid's definitions, postulates, and common notions. Hilbert's axioms for plane geometry.

Week 2. *(21-25 September)* §2.3: Book I of Euclid's *Elements*; neutral geometry. Quiz #1 written and Assignment #1 due on Monday, 21 September.

Week 3. *(28 September – 2 October)* §2.3: Book I of Euclid's *Elements* continued; more neutral geometry. Quiz #2 written on Monday, 28 September.

Week 4. *5-9 October)* §2.4, 3.1: Book I of Euclid's *Elements* continued; parallelism. Quiz #3 written and Assignment #2 due on Monday, 5 October.

Week 5. *(12-16 October)* §3.2–3.3: Book I of Euclid's *Elements* continued; areas and the Pythagorean Theorem. Quiz #4 written on Tuesday, 13 October. *No classes on Thanksgiving Day, Monday, 12 October.*

Week 6. *(19-23 October)* §3.4–3.5: A little of Books II & V of Euclid's *Elements*; areas and proportions. Quiz #5 written and Assignment #3 due on Monday, 19 October.

Fall Reading Week. *(26-30 October)* Enjoy!

Week 7. *(2-6 November)* §4.1–4.2: A little of Book III of Euclid's *Elements*; circles and triangles. Quiz #6 written on Monday, 2 November.

Week 8. *(9-13 November.)* §4.3–4.4: A little of Book IV of Euclid's *Elements*; regular polygons, circumference and area of a circle. Quiz #7 written and Assignment #4 due on Monday, 9 November. *The last date to drop Fall half-courses without academic penalty is Tuesday, 10 November.*

Week 9. *(16-20 November)* §4.4–4.5: Triangles and circles. Quiz #8 written on Monday, 16 November.

Week 10. *(23-27 November)* §5.1–5.2: A very little of Book VI of Euclid's *Elements*; division of line segments, Menelaus' Theorem. Quiz #9 written and Assignment #5 due on Monday, 23 November. Take-home final examination distributed on Thursday, 26 November.

Week 11. *(30 November – 4 December)* §5.2: Ceva's Theorem, the Euler line. Quiz #10 written on Monday, 30 November.

Week 12. *(7-9 December)* The nine-point circle. Quiz #11 written and Assignment #6 due on Monday, 7 December. *Wednesday, 9 December, is the last day of classes.*

Fall examination period. *(10-22 December)* Take-home final examination due on Friday, 18 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` .*

For clarity, the following guidelines will apply in MATH 2260H:

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 consult whatever sources you wish. However, **all work submitted for credit must be written up entirely by you, giving due credit to all relevant sources of help and information**. You may neither give nor receive any help on the quizzes, nor use any aids, except as noted below or with the instructor's express permission. The restrictions applicable to the take-home final exam will be spelled out on the exam.

For the quizzes, you may use whatever calculators you wish and an 8.5"×11" (or A4) aid sheet with whatever you want on written on all sides of it. Software such as `Maple`, `GeoGebra`, or `Geometer's Sketchpad` may occasionally come in handy when doing some of the assignments or to check answers when studying.

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`. 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.*

Web Page

MATH 2260H will make only minimal use of Blackboard/LearningSystem. Hopefully up-to-date information about the course and all handouts will be posted to: `www.trentu.ca/mathematics/sb/2260H/`