



School of Arts & Science
MATHEMATICS DEPARTMENT
MATH 113 – Sections 1 & 2
Fundamentals of Mathematics 2
2011W

COURSE OUTLINE

Prerequisite: Principles of Math 11 or assessment

Course Description

Designed for the prospective elementary school teacher. Topics include: numeration systems, algorithms for addition, subtraction, multiplication and division, sequences, prime numbers, divisibility, cryptography, probability experiments, symmetry, polygons, tessellations, geometric constructions, congruence, area, Pythagorean theorem, similarity, surface area, volume, polyhedra, topological equivalence of shapes, recreational topology, perspective in art, spherical geometry. (T)

1. Instructor Information

(a)	Instructor:	Jill Britton		
(b)	Office Hours:	Daily 10:30-12:30		
(c)	Location:	E246		
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(e)	Email:	jbritton@camosun.bc.ca		
(f)	Website:	http://britton.disted.camosun.bc.ca		

2. Intended Learning Outcomes

At the end of the course students will be able to:

1. Convert between selected past and present numeration systems.
2. Analyze and validate different algorithms for addition, subtraction, multiplication and division.
3. Deduce and/or use formulas for terms and sums of terms of selected sequences (arithmetic, geometric, power).
4. Demonstrate competence in selected topics from number theory including prime numbers, GCD and LCM, modular (clock) arithmetic, the binary sequence, Pascal's triangle, and Venn diagrams.
5. Apply classic tests for divisibility.
6. Decode messages encrypted by substitution and modular (clock) arithmetic.
7. Execute classic probability experiments (capture-recapture, randomized responses, Plinko, the Monty Hall problem).
8. Apply triangle congruence, triangle similarity, and Euclidean constructions to geometric problems.
9. Identify classic proofs of the Pythagorean Theorem and apply the theorem to Pythagorean triples.

10. Derive and use measurement formulas for classic 2-D and 3-D figures.
11. Identify the use of perspective in classic artworks.
12. Apply the postulates of spherical geometry.
13. Identify the kinds of symmetry in polygons and selected graphics.
14. Create tessellating artwork with modified polygons using manual techniques and by accessing TesselMania! or Tessellation Exploration software.
15. Construct regular and semi-regular polyhedra by joining faces, using strut construction, by assembling paper nets, and by using paper folding (modular origami).
16. Build a tetrahedron kite, an icosahedron globe or geodesic, and polyhedra bubbles.
17. Identify topological properties of shapes, networks, mazes, and maps.
18. Assemble and use flexagons and kaleidocycles.

3. Required Materials

There will be no prescribed text. Two manuals will be distributed, the first to assist in the meeting of learning outcomes 1 to 12 and the second in the meeting of learning outcomes 13 to 18. Additional material for outcomes 13 to 16 can be found in the instructor's published books and in the coordinated web pages of links [Investigating Patterns: Symmetry and Tessellations](#) and [Investigating Patterns: Polyhedra Pastimes](#). Additional material for learning outcomes 17 and 18 can be found in the web page [Rubber Geometry](#). Students must purchase a materials card (\$55) in the bookstore to cover the cost of the manuals, handouts and other consumables.

4. Course Content

This course has been designed to enrich the mathematical background of students intending to pursue a degree in Elementary Education. The content is NOT directly related to the standard elementary or middle school mathematics curriculum. Attendance in classes in red italic text ("REC MATH") is mandatory. A portfolio of corresponding assignments will be collected on the last day of classes. The content of all other classes is subject to in-class testing, All material will be included in a cumulative 3-hour exam during the final examination period.

Mathematics: A Universal Language	1 class
Numeration Systems Past and Present	3 classes
Algorithms for Whole Number Operations	2 classes
Sequences	5 classes
Primes / Prime Factorization / Divisibility	2 classes
Designs from Mathematical Patterns	2 classes
Cryptography	2 classes
<i>Symmetry & Polygons</i>	<i>3 classes</i>
<i>Tessellations & Escher Art</i>	<i>6 classes</i>
Introducing Geometry	2 classes
Basic Geometric Constructions	2 classes
Geometric Designs	2 classes
Triangle Congruence	2 classes
Area of Plane Figures	2 classes
The Theorem of Pythagoras	2 classes
Similarity	2 classes
Surface Area, Volume / Spherical Geometry	3 classes
Probability Experiments	2 classes
<i>Polyhedra</i>	<i>9 classes</i>
<i>Recreational Topology</i>	<i>6 classes</i>
Tests, miscellaneous	4 classes
Holidays / reading break / spare	6 classes

Attendance is compulsory in classes in red italic text.

5. Basis of Student Assessment (Weighting)

Evaluation will be based on

- (1) Assignments (15%)
- (2) Class Tests (20%)
- (3) Portfolio (30%)
- (4) Math Trail (5%)
- (5) Final Examination (30%)

Students will be awarded an A+, A, or A- in the course if and only if they would be awarded at least the same letter grade for their term mark, for the final exam, AND for the portfolio ... indicating a consistent performance. Students who do not meet this minimum requirement will be awarded a letter grade that is one category lower.

A minimum of 50% on the final exam is necessary for grades of C or higher.

Students will not be awarded a passing grade until they have submitted a satisfactory portfolio.

6. Grading System

Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	1
0-49	F	Minimum level has not been achieved.	0

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy E-1.5 at camosun.ca for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. <i>(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)</i>
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.

7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services or the College web site at camosun.ca.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services and on the College web site in the Policy Section.