INSTRUCTOR: (Mrs.) Jill Britton

OFFICE: E246

OFFICE HOURS: 10:30-11:20 *(daily)*

TEXTS: FINITE MATHEMATICS, 6th Edition (S. T. Tan)
Camosun Bookstore: $99.75
SUPPLEMENTARY MATERIAL TO ACCOMPANY FINITE MATHEMATICS, 6th Edition
Camosun Bookstore: $12.75

CALCULATOR: Each student must possess a **SHARP** model **EL-531** scientific calculator.
The instructor will be demonstrating with a model **EL-531RH**.
Camosun Bookstore: $18.95

MATERIALS: Compulsory Materials Fee for "Exploring Patterns" ($35)   **PAYABLE BY SEPT 30**

COMPUTER LAB: Each student is required to have a Camosun account to access the General Purpose Labs. An account can be created while applying for a Student ID Card in the Library or in the General Purpose Labs. Accounts take 24 hours to fully activate.

EVALUATION: Term Mark: (75 marks)
Each student's numerical term mark will be based on five (5) class tests.
Dates: Sept 20 [Symbolic Logic, 6.1]
         Oct 11 [6.2 - 6.4]
         Nov 8 [7.1 - 7.5 *to Tree Diagrams*]
         Nov 22 [Tree Diagrams, 8.1 - 8.3]
         Nov 29 [8.4 - 8.6]

Exploring Patterns: (25 marks)
This material will be covered during the weeks of Sept 30, Oct 7, Oct 14, Nov 25, and
Dec 2. Assessment will be based on a portfolio of class and assigned work. Attendance is compulsory.

Comprehensive (3 hr) Final Examination: (75 marks)
Date: Examination Period (December 9-17)

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Should a student fail to write a test(s), a mark of zero will be awarded for that test(s).
Individual students will not be awarded a passing grade until they have completed the "Exploring Patterns" component satisfactorily. The numerical mark awarded shall be the **SUM** of the mark on "Exploring Patterns" plus the **greater** of:

(1) the **average** of the term and final exam marks
(2) the final exam mark

Letter grades will be awarded as follows:
95-100 *and* greater than 90 average during term (A+), 90-94 (A), 85-89 (A-),
80-84 (B+), 75-79 (B), 70-74 (B-), 65-69 (C+), 60-64 (C), 50-59 (D), < 50 (F)
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MATH 112 - <u>SCHEDULE OF CLASSES</u> - FALL 2002

Week of Sep 2   M - **LABOUR DAY (College Closed)**
                  T - General Introduction
                  W - A1
                  H - A2
                  F - A2 / A3

Week of Sep 9   M - A3
                  T - A4
                  W - A4 / A5
                  H - A5
                  F - A5 / Using Valid Argument Forms

Week of Sep 16   M - Using Valid Argument Forms / 6.1
                  T - 6.1
                  W - 6.1 / 6.2
                  H - 6.2
                  F - **TEST 1 [Symbolic Logic, 6.1]**

Week of Sep 23   M - 6.2 / 6.3
                  T - 6.3
                  W - 6.4 *(P: #1-5)*
                  H - 6.4 *(P: #6-14)*
                  F - 6.4 *(P: #15-18)*

Week of Sep 30   M - 6.4 *(C: #1-6)*
                  T - 6.4 *(C: #7-14)*
                  W - 6.4 *(C: #15-18)*
                  H - Sieve of Eratosthenes / Magic Squares
                  F - Clock (Mod) Arithmetic

Week of Oct 7   M - Golden Ratio
                  T - Fibonacci Sequence
                  W - Binary Sequence / Pascal's Triangle
                  H - **TEST 2 [6.2 - 6.4]**
                  F - **CLASS CANCELLED**

Week of Oct 14   M - **THANKSGIVING (College Closed)**
                  T - Patterns in Pascal's Triangle
                  W - The Conics
                  H - The Conics / Moire Patterns
                  F - Line Designs / Curve Stitching

Week of Oct 21	M	-	Curves of Constant Width
	T	-	Cycloids
	W	-	Fractals
	H	-	7.1 / 7.2
	F	-	7.2 / 7.3

Week of Oct 28	M	-	7.3
	T	-	7.4
	W	-	7.4
	H	-	7.5 *(#1-5)*
	F	-	7.5 *(#6-8)*

Week of Nov 4	M	-	7.5 *(#9-11)*
	T	-	7.5 *(#12-14,16)*
	W	-	8.1
	H	-	8.2
	F	-	**TEST 3 [7.1 - 7.5 (to Tree Diagrams)]**

Week of Nov 11	M	-	**REMEMBRANCE DAY (College Closed)**
	T	-	8.2
	W	-	8.3
	H	-	8.3
	F	-	8.4

Week of Nov 18	M	-	8.4
	T	-	8.5
	W	-	8.5
	H	-	8.5 / 8.6
	F	-	**TEST 4 [Tree Diagrams, 8.1 - 8.3]**

Week of Nov 25	M	-	8.6
	T	-	8.6
	W	-	Topological Equivalence
	H	-	Jordan Curves / Mazes / Networks / Map Coloring
	F	-	**TEST 5 [8.4 - 8.6]**

Week of Dec 2	M	-	FINAL EXAM OUTLINE & DISCUSSION
	T	-	Math-e-Magic / Moebius Bands
	W	-	Flexagons
	H	-	Miscellaneous Diversions
	F	-	VIDEOS [*Donald Duck in Mathmagic Land / Mathematics Peepshow / Art At Play (Escher)*

Mathematics 112 Portfolio

To demonstrate mastery of the concepts in the ***Investigating Patterns*** portion of this course, each student must submit a portfolio of assigned work by a specific date. Portfolios will be returned. Each student's submissions must be assembled in a standard 3-ring binder. Pages may be 3-hole punched or inserted in 3-hole plastic sleeves. Portfolios will be evaluated on their completeness, quality, accuracy, and originality. Ten percent of the grade will be reserved for manner and quality of presentation (make an impact) and ten percent for supplementary investigations (at least 3 / at most 5 distinct topics). Attendance in corresponding classes is compulsory; 1 point will be deducted from the 25 point maximum for each absence.
Web pages can accessed from: http://www.camosun.bc.ca/~jbritton/jbfunpatt.htm

The individual assignments are as follows:

Topic 1: - *Using prime factorization to find their divisors*, show that 496 is a perfect number, and that 1184 and 1210 form an amicable pair.
- Construct a 9th order normal magic square using de La Loubère's diagonal method. Find the square's magic constant using the formula.

Topic 2: - Access the ***Perpetual Calendar*** web page, then determine the day (Sunday to Saturday) of your birth (please state). *SHOW ALL WORK*
- Complete both pages of the modular art exercise (duplicate provided).

Topic 3: - Access the ***Knotty Pentagram*** web page, then complete the exercise described therein. The size of your submission is at your discretion.
- Complete the golden sketch exercise (duplicate provided).

Topic 4: - Using a compass, complete the Fibonacci whirling squares exercise (duplicate provided). *ACCURACY IS ESSENTIAL*
- Complete the genealogical tree of a male bee exercise (duplicate provided). *COUNT THE MALE/FEMALE/TOTAL BEES AND COMMENT*

Topic 5: - Complete the binary light bulb exercise (duplicate provided).
- Convert the decimal number 1492 to its binary representation using the technique of repeated division by 2. Verify your result by addition.
- Access the web page ***Multiplying by Doubling***, select two numbers greater than 50 neither of which is a power of 2 (to avoid trivial examples), then multiply them using the doubling method. Multiply the same two numbers using traditional multiplication. Compare your results. As per the web page, explain clearly why the method works.

Topic 6: - Complete the Binomial Expansion and Pascal's Triangle exercise.
- Complete the multiples of 6 visual pattern using mod 6 arithmetic (two duplicates provided). *USE ONE COPY FOR THE NUMBERS AND THE OTHER COPY FOR THE DESIGN (FILLING IN "ZERO" CELLS)*

Topic 7: - Draw an ellipse using pin-and-string construction.

Topic 8: - Outline a hyperbola by paper-folding (duplicate provided).

Topic 9: - Construct a "n to 3n mod 72" line design (duplicate provided).
- Construct a "n to 2n mod 36" curve stitching diagram (duplicate on cardstock provided). Use minimal chord on the back side (accessible).

Topic 10: - Construct a Reuleaux triangle with rounded corners and a constant width of 5 inches based on an equilateral triangle with a side length of 3 inches (worksheet provided). *ACCURACY IS ESSENTIAL*

Topic 11: - Complete the roulette exercise involving Base Circle (3) (duplicate provided). *USE THE PUNCHED HOLE - A POINT "INSIDE" WHEEL (1)*
- Complete the roulette exercise involving Base Circle (5) (duplicate provided). *USE THE NOTCH - A POINT "ON" THE RIM OF WHEEL (1)*
- A recent release of "SPIROGRAPH" includes a Reuleaux triangle and a wheel 84. How many cusps could you expect by rolling wheel 84 inside ring 105? Explain using prime factorization, evaluating the gcd (105,84), and applying the appropriate formula.

Topic 12: - Complete the Snowflake Curve (duplicate provided). *USE A RULER*
- Complete the Sierpinski Triangle fractal (duplicate provided). *DITTO*

Topic 13: - Create an example of anamorphic art (2-page duplicate provided). *SUBMIT BOTH VERSIONS / QUALITY AND COMPLEXITY JUDGED*

Topic 14: - Complete the "fishy" maze exercise (duplicate provided). *APPLY THE ODD/EVEN NUMBER OF CROSSINGS RULE - COLOR TO VERIFY*
- Complete the bridges/tunnels exercise (duplicate provided). *APPLY THE ODD/EVEN CORNER RULE TO THE SIMPLIFIED NETWORK*

Topic 15: - Assemble a hanging boots puzzle. *NO CREASE SHOULD BE EVIDENT*

Topic 16: - Prepare a tetra-tetra-flexagon with six identical distinct stickers replacing each of the four sets of numbers.
- Prepare a numbered hexa-hexa-flexagon.

TOPIC	DESCRIPTION	MAX	GRADE	COMMENT
General	*manner & quality of presentation*	2.5		
Topic 1	perfect number & amicable pair	1		
	9 x 9 magic square / formula	1		
Topic 2	perpetual calendar	0.5		
	modular art	1.5		
Topic 3	knotty pentagram	0.5		
	golden sketch	0.5		
Topic 4	Fibonacci whirling squares	0.5		
	male bee family tree	0.5		
Topic 5	light bulbs (binary to decimal)	0.5		
	1492 (decimal to binary / verify)	0.5		
	multiplying by doubling	1		
Topic 6	Binomial Expansion & Pascal's	0.5		
	Pascal's Triangle visual pattern	1.5		
Topic 7	pin-and-string ellipse	0.5		
Topic 8	hyperbola by paper-folding	0.5		
Topic 9	n to 3n line design	1		
	n to 2n curve stitching	1		
Topic 10	Reuleaux construction	0.5		
Topic 11	base circle 3 (ellipse)	0.5		
	base circle 5 (nephroid)	0.5		
	spirograph (wheel 84 in ring 105)	0.5		
Topic 12	snowflake curve	0.5		
	Sierpinski triangle	0.5		
Topic 13	anamorphic art	1.5		
Topic 14	"fishy" Jordan curve maze	0.5		
	New York City bridges network	0.5		
Topic 15	hanging boots puzzle	0.5		
Topic 16	tetra-tetra-flexagon	0.5		
	hexa-hexa-flexagon	0.5		
Other	*supplementary investigations*	2.5		
	TOTAL	25		