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<tr><td colspan="2" align="center">CAPILANO UNIVERSITY
COURSE OUTLINE</td></tr>
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CAPILANO UNIVERSITY			

Term:	**Fall 2015**	Course No. **MATH 300**
Course: **MATHEMATICS AND CREATIVE ARTS**		Credits: **3.0** Section:
INSTRUCTOR Office: Tel: **604-986-1911 (Ext.)** email: @capilanou.ca		

COURSE FORMAT: Three hours of class time, plus an additional hour of supplemental activity delivered through on-line or other activities for a 15 week semester, which includes two weeks for final exams.

PREREQUISITES: 45 credits of 100-level or higher coursework.
Note: Students do not need to have any musical training to take this course.

COURSE DESCRIPTION:

This course is a study of the connections between math and the creative arts. Mathematics has been used as a tool and as inspiration to create a variety of works in music, literature and the visual arts. Math can also be used to analyse these works. Through presentation of the mathematical concepts, followed by examination of case studies from music, literature, visual arts and other creative arts, this course uncovers the math both in the forefront and behind the art. We will also develop some beautiful mathematical proofs to demonstrate that mathematics should be viewed as a creative art in its own right.

COURSE OBJECTIVES:

General: The mathematical concepts covered in this course include:
- Proportion and ratio, golden ratio and the Fibonacci numbers;
- Arithmetic and geometric sequences
- Divisibility, prime factorization, modular arithmetic
- Algorithm and Latin squares
- Cartesian graphs, symmetries and transformations
- Geometry of regular polygons

A selection of the following will be covered (as time permits):
- Fractals
- Tilings
- Frieze patterns
- 3D perspective
- Combinatorics: permutations and combinations, aleatory and probability
- Geometric series
- Graph Theory

Student Learning Outcomes: Upon successful completion of this course, students will be able to do the following:
- understand how the mathematical concepts are illustrated in works of visual art, music and literature;
- be able to solve mathematical problems chosen from the concept areas; and
- be able to recognize and identify the use of these concepts in a variety of works of art.

REQUIRED COURSE MATERIALS:

Required Textbook: Abbot, Edwin. Flatland, A Romance in Many Dimensions. NY Dover. First Published: 1884.

Calculator: Students must have a calculator for arithmetic. A graphing calculator is permitted.

Other Requirements: Students must have a ruler, protractor and compass. Note: the ruler must have length at least 30 cm.

Reference Texts: For a list of reference texts, see website at: http://66.51.172.120/llajeune/math300/bibliography.html

COURSE CONTENT:

Classes (approx.)	Mathematical Topic	Case Studies
3	Proportion and ratio; golden ratio, Fibonacci numbers	**Music, Visual Art and Literature:** Musical intervals Proportion in poetry, music, visual art, design and crafts
3	Divisibility; modular arithmetic; code breaking: substitution and Playfair ciphers	**Music:** Octave equivalence, tuning **Mystery Fiction:** *Have his Carcase* by Dorothy Sayer **Games:** Nim
2	Deterministic and non-deterministic algorithms random number generators	**Literature:** *Oulipo: n+7* **Music:** ViHart *Binary Rhythms; Musical Dice* **Visual Art:** Georg Nees, *Schotter*

Classes (approx.)	Mathematical Topic	Case Studies
2	Graphs; graph transformations	**Music:** Use of counterpoint by composers from the Renaissance to present day
3	Latin squares, Orthogonal Latin Squares	**Literature:** *Life a User's Manual*, by Georges Perec **Music:** 20th-century serialism **Games:** Sudoku
2-3	Geometry; geometry of regular polygons	**Visual Art:** tilings, frieze patterns **Music:** tilings, frieze patterns **Literature:** *Flatland* by Edwin Abbot
3-4	Geometry for 3D-perspective; Quantitative perspective	**Visual Art:** one-point, two-point and three-point perspective
2	Fractals; Sequences and series concepts of infinity and limit;	**Visual Art:** M.C. Escher; fractal art **Music:** Fractals in music
1	Sequences and patterns; permutations and combinations	**Literature:** Sestina form, Beckett, Queneau and Oulipo **Music:** Mersenne, Euler, Mozart
1	Graph theory	**Various:** Examples from music, literature, visual art, games
1	Mathematics as art: precision, economy and elegance	Examples of beautiful mathematical proofs from geometry and other areas
2	Testing/Evaluation	

Note: The coverage of these topics may vary in a given semester.

COURSE ASSIGNMENTS:

Term work will consist of assignments, term tests and a term project. A list of suggested topics for the term project will be provided by the instructor. Students who wish to select their own topic must have it approved by the instructor in advance. Topics may be chosen from a variety of areas suited to the student's particular interest. Subject areas include music, visual art, dance, theatre, literature, games and crafts.

EVALUATION PROFILE:

Final grades for the course will be computed based on the following schedule:

2 Term Tests	35%
Assignments	10%
2 Reading Reports	5%
Term Project	15%
Final Exam	*25%
Personal Evaluation	10%
TOTAL	100%

*   If the percentage achieved on the Final Exam is higher than the percentage achieved on the Term Tests component, then the Final Exam weight will be increased to 35% and the Term Tests will be decreased to 25%.

PERSONAL EVALUATION:

In the absence of exceptional circumstances, which are evaluated at the instructor's discretion, the personal evaluation component of the final grade will be pro-rated to the rest of the grade. For example, a 10% personal evaluation component would be determined by dividing the remaining mark out of 90 by 9. The most common circumstance justifying an increased personal evaluation mark is a student's improved performance in the final examination relative to the term work, which the instructor feels justifies an elevated letter grade.

SUPPLEMENTAL 4TH HOUR ACTIVITY:

Each section has, in addition to the 3 hours of scheduled classroom time per week, a supplemental activity. This activity might be a scheduled tutorial or lab, an on-line activity, a group meeting, or some other activity as indicated by the instructor. Students are expected to participate in this additional activity. If this is not possible, students should consult their instructor to determine how this missed activity can be completed. It is in the student's best interest to ensure that any missed course activity is completed.

GRADING PROFILE: Letter grades will be assigned according to the following guidelines:

A+ 90 - 100%	B+ 77 - 79%	C+ 67 - 69%	D 50 - 59%
A 85 - 89%	B 73 - 76%	C 63 - 66%	F 0 - 49%
A- 80 - 84%	B- 70 - 72%	C- 60 - 62%	

Students should refer to the University Calendar for the effect of the above grades on grade point average.

TESTS: Dates for tests will be announced beforehand in class.

HOMEWORK: It is expected that students spend at least 8 hours per week doing course work outside of class time.

ASSIGNMENTS: Assignments are due at the beginning of class, unless otherwise announced. Late assignments may receive a grade of zero.

OPERATIONAL DETAILS:

University Policies: Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Cheating and Plagiarism, Academic Probation and other education issues. These and other policies are available on the University website.

Attendance: Regular attendance is essential. If classes are missed, it is the student's responsibility to become aware of all information given out in the classes or tutorials, including times of examinations and assignment deadlines.

Missed Exams: Normally, a score of zero will be given for a missed exam, test, quiz, lab, etc. In some exceptional situations, the student will be permitted to write a make-up test, defer the lab to a later date or to replace the score by other marks.

The situations in which a score of zero may be avoided are those for which the student meets **all** of the following conditions:

1. Circumstances clearly beyond the control of the student caused the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do **NOT** include forgetting about the test, lack of preparation for the test, work-related or social obligations.

2. The student has notified the instructor (or the Pure and Applied Science office staff, if the instructor is not available) about the missed exam, test, quiz, lab, etc. Such notification **MUST** occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.

3. Proof of the circumstances is provided. Proper proof of illness or injury requires a medical certificate from a doctor, who may also be consulted.

4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. **Fully participating means attending almost all of the classes and turning in almost all assignments in the course.**

The options offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

Final Exam Period: Students should note that the final exam period is from **(date)** *(includes Saturday, ??),* and that they can expect to write exams at any time during this period. Individual exam times will not normally be rescheduled because of holidays, work, or other commitments. While efforts are made to spread exams throughout the exam period, an individual's particular course combination may result in exams being scheduled close together, or spread widely through the entire exam period.

Cheating/Plagiarism: Students caught cheating on a test will normally receive a grade of "F" for the course and may be expelled from the University. Plagiarism (including the copying of any part of assignments, laboratory reports and essays) is a serious offence and is a form of cheating.

Incomplete Grades: Incomplete grades ("I") are given only when special arrangements have been agreed upon with the instructor prior to the end of the semester. Since "I" grades are granted only in exceptional circumstances (usually health problems), their occurrence is rare.

English Usage: Students are expected to use correct standard English in their written and oral assignments, exams, presentations and discussions. Failure to do so may result in reduced grades in any part of the Evaluation Profile.   Please refer to the guidelines provided in the Capilano Guide to Writing Assignments (available from the University Bookstore).

Mathematical Language: Use of proper Mathematical terminology and notation is an important component of Mathematics. Marks may be deducted for improper usage. For full details, please refer to the Math Department Style Guide at: http://www.capilanou.ca/math/Math-Department-Style-Guide/

Mathematics Learning Centre: Instructional help and Mathematics learning aids, such as audio visual materials, computer software and reference texts are available to students in the Birch Building (BR289).

Emergency Procedures: Please read the emergency procedures posted on the wall of the classroom.