JOHN ABBOTT CEGEP/COLLEGE

Mathematical Puzzles, Games and Other Diversions

COMPLEMENTARY COURSE
COURSE OUTLINE
FALL 2022

General Information.

Discipline: Mathematics *Course number*: 201-DAC-AB
Ponderation: 3-0-3 *Credits*: 2 *Prerequisite*: None
Objectives:

- 0012: Use various mathematical or computer science concepts, procedures and tools for common tasks.

Your teacher will give you his/her schedule and availability.
Students are strongly advised to seek help promptly from their teacher if they encounter difficulties in the course.

Introduction. This course will cover the fun side of mathematics. Mathematics pervades the world, yet what we see in most math courses only scratches the surface. Through games, puzzles, magic, and examples from daily life, this course will explore fundamental mathematical concepts like probability and logic, and their application outside of the standard textbook context.

The primary purpose of the course is the attainment of Objective 0012 ("Use various mathematical or computer science concepts, procedures and tools for common tasks"). Emphasis is placed on clarity and rigour in reasoning and in the application of methods. The basic concepts are illustrated by applying them to various problems where their application helps arrive at a solution. In this way, the course encourages the student to apply learning acquired in one context to problems arising in another.

Students are permitted to use a scientific or graphing calculator in class. Students will have access to the Math Lab where suitable mathematical software, including MAPLE, is available for student use.

Recommended Texts.

- *The Mathematics of Games and Gambling*, by Edward Packel
  Mathematical Association of America, 2012 (approximately $60)
- *Lady Luck*, by Warren Weaver
  Dover Publications, 1982 (approximately $20)

OBJECTIVE	STANDARD
Statement of the Competency	**Achievement Context**
Use various mathematical or computer science concepts, procedures and tools for common tasks (0012).	• Working alone • While carrying out a task or solving a problem based on everyday needs • Using familiar tools and reference materials
Elements of the Competency	**Performance Criteria**
1. Demonstrate the acquisition of basic functional knowledge in mathematics or computer science.	• Brief definition of concepts • Correct execution of basic operations • Appropriate use of terminology
2. Select mathematical or computing tools and procedures on the basis of specific needs.	• Listing of numerous possibilities available through the use of mathematical and computing tools and procedures • Analysis of concrete situations and recognition of the usefulness of mathematical or computing tools and procedures • Appropriate choice according to needs
3. Use mathematical or computing tools and procedures to carry out tasks and solve problems.	• Use of a planned and methodical process • Correct use of tools and procedures • Satisfactory results, given the context • Appropriate use of terminology specific to a tool or procedure
4. Interpret the quantitative data or results obtained using mathematical or computing tools and procedures.	• Accurate interpretation, given the context • Clear, precise formulation of the interpretation

Course Content. Individual teachers will provide supplementary notes and problems as they see fit. Regular work done as the course progresses should make it easier for you to master the course.

1. *Logic and Reasoning.*

1.1 Logic Puzzles
1.2 Counting Problems
1.3 Self-Referential Statements and Paradoxes
1.4 Simple proofs (e.g. infinitude of primes, irrationality)

2. *Probability and Combinatorics.*

2.1 Basic Probability
2.2 Lotteries and Raffles
2.3 Dice, Card and Casino Games
2.4 Classic Probability Problems (e.g. Monty Hall, Bertrand's Box)

3. *Analysis of Games.*

3.1 Combinatorial Games (e.g. Tic-Tac-Toe, Nim, chess)
3.2 Non-transitive games
3.3 Elections and Preference

4. *Assorted Math Fun.*

4.1 Magic Tricks
4.2 Origami, Hexaflexagons and other topological curiosities
4.3 Classic Puzzles and Toys (e.g. Rubik's Cube, Sudoku, Tangrams)
4.4 Cryptography
4.5 Surprising Math

Teaching Methods. This course will be 45 hours, meeting twice per week for a total of three hours per week. This course relies mainly on the lecture method, although at least one of the following techniques is used as well: question-and-answer sessions, labs, problem-solving periods, class discussions, and assigned reading for independent study. Generally, each class session begins with a question period of previous topics, then new material is introduced, followed by examples.

Other Resources.
Math Website.
http://departments.johnabbott.qc.ca/departments/mathematics

Math Study Area. Located in H-200A and H-200B; the common area is usually open from 8:30 to 17:30 on weekdays as a quiet study space. Computers and printers are available for math-related assignments. It is also possible to borrow course materials when the attendant is present.

Math Help Centre. Located in H-216; teachers are on duty from 8:30 until 15:30 to give math help on a drop-in basis.

Academic Success Centre. The Academic Success Centre, located in H-117, offers study skills workshops and individual tutoring.

Departmental Attendance Policy. Due to the COVID-19 health crisis, attendance policies may need to be adjusted by your teacher. Regular attendance is expected, and your teacher will inform you of any details or modifications as needed. Please note that attendance continues to be extremely important for your learning, but your teacher may need to define it in different terms based on the way your course is delivered during the semester.

Additional Software. In addition to LEA, Teams and Moodle, additional software may be used for the submission of essays or projects or for testing. Further details will be provided if applicable.

Class Recordings. Classes on Teams or other platforms may be recorded by your teacher and subsequently posted on Teams and/or LEA to help for study purposes only. If you do not wish to be part of the recording, please let your teacher know that you wish to not make use of your camera, microphone or chat during recorded segments. Any material produced as part of this course, including, but not limited to, any pre-recorded or live video is protected by copyright, intellectual property rights and image rights, regardless of the medium used. It is strictly forbidden to copy, redistribute, reproduce, republish, store in any way, retransmit or modify this material. Any contravention of these conditions of use may be subject to sanction(s) by John Abbott College.

Course Outline Change. Please note that course outlines may be modified if health authorities change the access allowed on-site. This includes the possibility of changing between an in-person and online format.

Test Accommodations. Should you need a special accommodation to write the On-Campus Midterm or Final Exam, please read the Math Department's policy.

Evaluation Plan. The Final Grade will consist of

- Class Work and Participation (15%)
- Homework and Quizzes (about 8-10, 30%)
- Two Tests (25%)
- Project and Presentation (25%)
- Final Reflection Paper (5%)

Course Costs. In addition to the cost of the recommended texts (see above), your instructor might recommend you acquire an inexpensive scientific calculator, two decks of cards, a set of five dice, two sets of bingo chips, coins to flip, tape and scissors ($30-$40).

College Policies.
Policy No. 7 - IPESA, Institutional Policy on the Evaluation of Student Achievement: http://johnabbott.qc.ca/ipesa.

Religious Holidays (Article 3.2.13 and 4.1.6). Students who wish to miss classes in order to observe religious holidays must inform their teacher of their intent in writing within the first two weeks of the semester.

Student Rights and Responsibilities: (Article 3.2.18). It is the responsibility of students to keep all assessed material returned to them and/or all digital work submitted to the teacher in the event of a grade review. (The deadline for a Grade Review is 4 weeks after the start of the next regular semester.)

Student Rights and Responsibilities: (Article 3.3.6). Students have the right to receive graded evaluations, for regular day division courses, within two weeks after the due date or exam/test date, except in extenuating circumstances. A maximum of three (3) weeks may apply in certain circumstances (ex. major essays) if approved by the department and stated on the course outline. For evaluations at the end of the semester/course, the results must be given to the student by the grade submission deadline (see current Academic Calendar). For intensive courses (i.e.: intersession, abridged courses) and AEC courses, timely feedback must be adjusted accordingly.

Academic Procedure: Academic Integrity, Cheating and Plagiarism (Article 9.1 and 9.2). Cheating and plagiarism are unacceptable at John Abbott College. They represent infractions against academic integrity. Students are expected to conduct themselves accordingly and must be responsible for all of their actions.

College definition of Cheating: Cheating means any dishonest or deceptive practice relative to examinations, tests, quizzes, lab assignments, research papers or other forms of evaluation tasks. Cheating includes, but is not restricted to, making use of or being in possession of unauthorized material or devices and/or obtaining or providing unauthorized assistance in writing examinations, papers or any other evaluation task and submitting the same work in more than one course without the teacher's permission. It is incumbent upon the department through the teacher to ensure students are forewarned about unauthorized material, devices or practices that are not permitted.

College definition of Plagiarism: Plagiarism is a form of cheating. It includes copying or paraphrasing (expressing the ideas of someone else in one's own words), of another person's work or the use of another person's work or ideas without acknowledgement of its source. Plagiarism can be from any source including books, magazines, electronic or photographic media or another student's paper or work.