

## General Information.

*Discipline:* Mathematics      *Course code:* 201-DAB-AB  
*Ponderation:* 3-0-3      *Credits:* 2      *Prerequisites:* none  
*Teacher:* Ken Gerber      *Days and Time:* T/R 10:00-11:30  
*Classroom:* Herzberg 028      *Office Hours:* TBD  
*Program:* This course is open to all programs.  
*Objectives:* 0011: To recognize the role of mathematics or informatics in contemporary society.

*Students are strongly advised to seek help from their instructor as soon as they encounter difficulties in the course.*

**Introduction.** Sports Math is a complementary mathematics course, which should appeal to a broad range of students, particularly those with an interest in amateur or professional sports. This course may be taken for credit towards the Social Science Sports Studies Certificate.

Sports and Mathematics have a long history. Sometimes it has been a collaborative one; at times, it has been a contentious one. This course aims to show how math has transformed the way sports are played, managed, understood and consumed. This prompts us to ask: *What kinds of sports questions can math answer?*

We will discuss this question against the backdrop of various sports: hockey, baseball, football, basketball, soccer, Olympic sports, and more. (See “Course Content” below.) We will utilize a variety of basic math tools along the way, including beginner level probability and statistics. The student should have a strong interest in and a casual knowledge of professional sports.

**Teaching Methods.** This course will be 45 hours, meeting twice a week for a total of 3 hours a week. The main techniques used will be the lecture and laboratory approaches. Audio and video presentations may be utilized in class as well. Other methods that may be used are: problem-solving sessions, class discussions and assigned reading for independent study. Students are responsible for all problems and exercises demonstrated in class or given in the lab sessions.

## Course Objectives.

- (1) To demonstrate the acquisition of basic general knowledge of mathematics or informatics.
- (2) To describe the evolution of mathematics or informatics.
- (3) To recognize the contribution of mathematics or informatics to the development of other areas of knowledge.
- (4) To illustrate the diversity of mathematical or informatics applications.
- (5) To evaluate the impact of mathematics or informatics on individuals and organizations.

**Textbook.** There is no textbook for this course.

## Course Costs.

Your instructor might recommend you acquire a scientific (non-graphing) calculator (available at Bureau en Gros for approximately \$5 to \$20).

**Departmental Attendance Policy.** Regular attendance is expected. Missing six classes is grounds for automatic failure in this course. Many of the failures in this course are due to students missing classes.

**Evaluation Plan.** A student’s Final Grade will be calculated by the following distribution. Linkage to course objectives are indicated in parentheses.

- Labs:	60%	Objectives 1, 2, 3, 4, 5
- Quizzes:	20%	Objectives 1, 2, 3, 4, 5
- Projects:	20%	Objectives 1, 3, 4, 5

**Labs.** There will be six in-class labs. These assignments are done in small groups and must be turned in before the end of class. The lowest two will be dropped. The remaining four are each worth 15%.

**Quizzes.** There will be two quizzes based on the content taught in class. Each is worth 10%. These will be a combination of computational material, as well as short answer and multiple choice.

**Projects.** There will be two individual projects, each worth 10%.

**Make-up Policy.** Students are expected to participate in labs, quizzes, and projects on the day of the scheduled assessment. In the case of illness (or other serious circumstances), the student is expected to contact the instructor by MIO or voicemail within 24 hours of the missed assessment, so that a make-up date can be arranged. The instructor may require documentation for the absence.

**Classroom Policy.** Cell phones are a distraction from learning—in the classroom or studying at home—and must be put away during class. If the student is expecting an emergency call, the student should inform the instructor before class, so that an exception can be made.

## 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 near H-211; teachers are on duty from 9:00 until 16:00 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.

## College Policies.

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

*Changes to Evaluation Plan in Course Outline (Article 5.3).* Changes require documented unanimous consent from regularly attending students and approval by the department and the program dean.

*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 teachers 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 ones own words), of another person's work or the use of another persons 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.

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**Course Content / Schedule.** Your teacher may supplement this list during the semester. Regular work done as the course progresses should make it easier for you to master the course.

### Week 1

- Introduction to the course
- *Scorigami: The Story of Every NFL Final Score that has Ever Happened*
- *FiveThirtyEight* Podcast "How One Mans Bad Math Helped Ruin Decades Of English Soccer" (2016). A very early and somewhat disastrous attempt at sports analytics.

### Week 2

- The "Pythagorean" Win Percentage: Baseball borrows a formula from geometry in a mostly successful attempt to measure luck.
- Lab #1 on this week's topic

### Week 3

- Records, Streaks, and Perfect Games: The probability behind notable sports accomplishments.
- Lab #2 on this week's topic

### Week 4

- Randall Cunningham: The first great two-way quarterback. Using the geometric mean to analyze quarterbacks who both run well and throw well; Two-way players in other sports.
- Lab #3 on this week's topic

### Week 5

- Math vs. Myth: Analyzing some stubbornly enduring clichés in sports.
- Project #1: Intro to Correlation (in P-308)

### Week 6

- Hockey Analytics: Plus-minus, the Corsi number, and face-offs.
- Jon Bois' *Chart Party*: "What if Barry Bonds had Played without a Baseball Bat?" and "Let's Talk About Colin Kaepernick"

### Week 7

- *Moneyball* (2011). Viewing of the film and discussion of the events surrounding Billy Beane's revolutionary use of statistics in baseball operations.

### Week 8

- The Extra Point vs. The Two-Point Conversion in Football and other applications of Expected Value
- Quiz #1 on first half of semester material

### Week 9

- Elo Ratings: How an old chess formula is being used in various sports to rate teams and competitors—and even help predict the results.
- Lab #4 on this week's topic

### Week10

- Triple Doubles (Basketball) and Power-Speed (Baseball): An introduction to the Pareto frontier.
- Project # 2: The Pareto Frontier (in P-308)

### Week 11

- Sports Gambling 101
- Lab #5 on this week's topic

### Week 12

- Home-field Advantage: Just how big is it? What causes it?
- Hockey Geometry: What's the best place on the ice to shoot the puck?

### Week 13

- *The Hidden Game of Baseball*: How Rod Thorn and Pete Palmer broke down baseball into measurable units.
- Lab #6 on this week's topic

### Week 14

- The Hot Hand in Basketball
- *Radiolab* Podcast "Stochasticity" (2009). Tips on viewing randomness and more on the Hot Hand.
- *Hot Takedown* Podcast "Do Athletes Really Run Hot and Cold?" (2017). A data-driven contrary viewpoint.

### Week 15

- Debunking the Curse of the *Sports Illustrated* Cover.
- Quiz #2 on second half of semester material.