

General Information.*Discipline:* Mathematics*Course code:* 201-115-AB*Ponderation:* 3-2-3*Credits:* $2\frac{2}{3}$ *Prerequisite:* Admission to program

Competency Code: 027B (in progress)

Competency information is explained in your Engineering Technologies program CD.

Introduction. Mathematical Models I is the first Mathematics course in the Engineering Technology Program. Therefore, students taking this course are expected to have an adequate knowledge of basic algebra from secondary school. This is essential so that those basic skills can be further developed during this course. Some topics of study include algebraic notions of, vectors, complex numbers, and systems of equations. Furthermore, the basics of Differential Calculus are introduced to prepare students for further study of Calculus in Mathematical Models II. As a result, a general theme of this course is to use mathematical concepts in applied areas of science and engineering. The primary purpose of the course is the partial attainment of Objective 027B (To organize information of the working environment of engineering technology). To achieve this objective, the course covers vectors, complex numbers, trigonometric, exponential, and logarithmic functions, and the mathematical modeling of physical situations. The course emphasizes clarity in reasoning and in 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 students to apply learning acquired in one context to problems arising in another.

Teaching Methods. This course is 75 hours, meeting three times a week for a total of 5 hours a week. Classes are primarily lectures, with discussions and problem-solving. If a student is absent from class, it is their responsibility to get the material covered that day. In addition, it is very important that students spend several hours per week reviewing the course material and solving suggested exercise. In the event that a student is experiencing difficulty, contact your instructor as soon as possible or one of the other resources listed directly below.

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.

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. The Final Grade is a combination of the Class Mark and the mark on the Final Exam. The Class Mark will include results from three or more tests (worth a maximum 75% of the Class Mark), homework, quizzes or other assignments/tests (worth a minimum 25% of the Class Mark). The specifics of the Class Mark will be given by each instructor during the first week of classes in an appendix to this outline. Every effort is made to ensure equivalence between the various sections of this course. The Final Exam is set by the Course Committee (which consists of all instructors currently teaching this course), and is marked by each individual instructor.

The Final Grade will be the better of:

50% Class Mark and 50% Final Exam Mark

or

25% Class Mark and 75% Final Exam Mark

A student *choosing not to write* the Final Exam will receive a failing grade of 50% or their Class Mark, whichever is less.

Students must be available until the end of the final examination period to write exams.

Required Texts. The textbook for this course is *Basic Technical Mathematics with Calculus, 10th Edition*, by Ally J. Washington (Pearson); it is available from the college bookstore for about \$180.

Course Costs. In addition to the cost of the text (about \$180), the instructor may recommend purchase of a scientific, non-programmable calculator (approximately \$20).

Course Content (with selected exercises). The exercises listed should help you practice and learn the material taught in this course; they form a good basis for homework. 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.

Review.

- 1.3 Significant Digits including use with Scientific Notation 13-30, 45-80
- 2.4 Radians, Degrees and Steradians, 5-8,17-32,43,44 and instructors examples
- 2.6 Solids 28-40

System of Linear Equations.

- 5.4 Two Equations in 2 variables algebraically 41-56
- 5.5 Two Equations in 2 variables by determinants 5,10,16,21,22,25,26,35-39,41,42
- 5.6 Three Equations in 3 variables algebraically 3,13,15,20,21,22,23
- 5.7 Three Equations in 3 variables by determinants 3,11,12,15,24,31-37

Vectors and Oblique Triangles.

- 9.1 Introduction 5-9,14,16,18,41,42,44,46,47,48 (also use rads)
- 9.2 Components 5-10,23,26,28,30 (also use rads)
- 9.3 Addition 25-34
- 9.4 Application 7-13,16,18,19,22,28,30
- 9.5 Law of Sines 3-5,23-45
- 9.6 Law of Cosines 3,7,21,23-40

Graphs of the Trigonometric Functions.

- 10.3 Trigonometric Graphs of sine and cosine (review) 3-26
- 10.5 Applications 7-22

Additional topics in Trigonometry.

- 20.5 Solving Trigonometric Equations 5-38

Complex Numbers.

- 12.1 Basics Definitions of Complex Numbers 7,11,15,17,20,25-27,30,33,36,40,43,45,48,49-59
- 12.2 Basic Operations with Complex Numbers 7,11,18,20,29,30,32,35,36,38,40-43,50,53,56,58
- 12.3 Graphs 3-18
- 12.4 Polar Form 3,4,8,15,18-21,27-29,32
- 12.5 Exponential Form 5-9,13,16,25,26,33,36
- 12.6 Products, Quotients, Powers and Roots 6,7,9,11,14,16,21,22,26,29,34,39,40
- 12.7 Application 3-16

Exponentials and Logarithmic Functions.

- 13.1 Review of Exponentials Functions
- 13.2 Review of Logarithmic Functions
- 13.3 Properties of exponentials and logs 10,13,16,22,24,27,29,34,36,45-62
- 13.4 Common logs 3,5,7,12,13,16,17,19,21

- 13.5 Natural logs 4,10,12,13,16,19
- 13.6 Equations 3-44

The Derivative.

- 23.1 Limits 31-48,57-60
- 23.2 Slope of Tangent 9
- 23.3 Derivative (using h) 8,19,27,30,34-38
- 23.5 Polynomials 10,15,22,24,27,28,37-53
- 23.6 Product and Quotient Rule 13,19,22,24,35,38,41,43,45,47,52,54,55
- 23.7 Power Rule 14,22,26,28,30,32,41,43,46,53
- 23.8 Implicit Differentiation using Differentials 11,18,21,26,31,32,35,36,41,45
- 23.9 Higher Derivatives 3-26, 31-36

Differentiation of Transcendental Functions.

- 27.1 Derivatives of Sine and Cosine 3-34
- 27.2 Derivatives of other Trigonometric Functions 3-38
- 27.5 Derivative of the Logarithmic Function 3-23,25-34
- 27.6 Derivative of the Exponential Function 3-30

College Policies. Article numbers refer to the IPESA (Institutional Policy on the Evaluation of Student Achievement, available at <http://johnabbott.qc.ca/ipesa>). Students are encouraged to consult the IPESA to learn more about their rights and responsibilities.

Changes to Evaluation Plan in Course Outline (Article 4.3). Changes to the evaluation plan, during the semester, require unanimous consent.

Mid-Semester Assessment MSA (Article 3.3). Students will receive an MSA in accordance with College procedures.

Religious Holidays (Article 3.2). Students who wish to observe religious holidays must inform their teacher in writing within the first two weeks of the semester of their intent.

Grade Reviews (Article 3.2, item 19). It is the responsibility of students to keep all assessed material returned to them in the event of a grade review. (The deadline for a Grade Review is 4 weeks after the start of the next regular semester.)

Results of Evaluations (Article 3.3, item 7). Students have the right to receive the results of evaluation, for regular day division courses, within two weeks. For evaluations at the end of the semester/course, the results must be given to the student by the grade submission deadline.

Cheating and Plagiarism (Articles 8.1 & 8.2). Cheating and plagiarism are serious infractions against academic integrity, which is highly valued at the College; they are unacceptable at John Abbott College. Students are expected to conduct themselves accordingly and must be responsible for all of their actions.