

Lakeside View  *Global Vision*
CEGEP JOHN ABBOTT COLLEGE

SCIENCE PROGRAM INFORMATION
200.B0

September, 2009

Lakeside View  *Global Vision*
CEGEP JOHN ABBOTT COLLEGE

August 24, 2009

Dear Science Student,

On behalf of the Science faculty and staff, I would like to welcome you to the Science Program at John Abbott College. We look forward to providing you with a stimulating learning environment and quality education.

We at Abbott are very proud of our Science Program. The program has recently received the highest rating of quality from the Commission d'évaluation de l'enseignement collégial (CEEC). The College was praised for its dynamic teachers and their innovative approaches to teaching science. Interactive laboratory instruction along with computer-based learning was noted by the CEEC as factors which engage students. Also highlighted was the range of science courses which allows students to sample a variety of fields important to their future university studies or career choice.

We are also proud of you. Your secondary school marks indicate that you have the potential to succeed at college. Science is a challenging and demanding program and sometimes you will find your studies difficult. However, if you work hard and consistently, seek help from your teachers when you need it, and keep your goals in mind, you should do fine. We pride ourselves at John Abbott in the many initiatives and support systems we have in place to help our students succeed.

We hope that this Science Program booklet will be helpful to you. Please read it carefully and save it for reference. It contains information about the Science Program that will be useful to you now and throughout your studies at John Abbott. A copy will also be posted on each Science department's website. Should you have any questions about the Science Program at any time, feel free to speak to your teachers or the chairs of the Science departments. You may also consult an academic advisor or come to my office, Herzberg 102 (H-102).

I wish you the best of luck and I hope that you will enjoy your studies at John Abbott College.

Erich Schmedt
Academic Dean
Interim Dean of Science

TABLE OF CONTENTS

	<i>Page</i>
1. Science Department Chair list	1
2. Resources available to students	1
3. Particular features of the John Abbott College Science program	2
4. Ministerial Science program objectives	3
5. Science program planner	4
6. Sequence of Science courses, by discipline	5
7. Science Program Comprehensive Assessment	6
8. Science Program Exit Profile	7-9

LIST OF SCIENCE DEPARTMENT CHAIRPEOPLE 2009-2010

		☎	<i>Office Number</i>
<i>Biology</i>	Neil Duffy	5188	H-357
<i>Chemistry</i>	Suzanne Black	5400	H-225
<i>Geology</i>	Julie Podmore	5496	P-218
<i>Mathematics</i>	Daniel Gatien	5840	H-202B
	Gennaro Rispoli	5838	H-207
	Ken Gerber	5855	H-226
<i>Physics</i>	Bruce Tracy	5185	H-319

RESOURCES AVAILABLE TO STUDENTS

John Abbott College offers a number of resources for students who may need some extra help with their studies. Please take advantage of the following services. They are there for you.

		Location
<i>Learning Centre</i>	Offers workshops on study skills, time management, etc, as well as tutoring in specific subjects	Herzberg 117
<i>Writing Centre</i>	Run by the English Department, it offers help in writing essays as well as assistance for non-native English speakers	Library Basement (019A)
<i>CAF</i>	Provides assistance in French	Penfield 004

Biology, Chemistry, Mathematics and Physics

Peer Tutoring Services: One-on-one tutoring is available in all the large Science departments. The students tutors have been chosen for their ability in Science. Please consult the department for location and schedules.

Computer-equipped study labs for student use: All Science departments have computer-equipped study labs for student use. Please contact the specific Department for details.

Math Help Center. The Mathematics department faculty staff a Math Help center in the afternoons (Herzberg 222). The Math study Lab is open during the morning.

Faculty are also available to you during their scheduled office hours.

SCIENCE PROGRAM

200.B0

Features of the John Abbott program:

The Science program is a pre-university program intended to provide students with a balanced education, which integrates the basic components of a rigorous scientific and general education

The approach is competency-based and interdisciplinary, emphasizing the ways in which scientific problem-solving techniques can be applied to other disciplines.

The Science Program prepares students for a number of university science and professional programs

- ▶ At John Abbott College, students select their option courses according to their intention to enter either a Pure and Applied or Health Science program at university
- ▶ Students are introduced to the Program Approach and the goals of the Science Program in the first semester, to all the required outcomes during the remaining science compulsory courses (either directly through projects or indirectly through course material) and then more explicitly assessed with respect to Exit Profile goals via the integrative and summative activities of the Science option courses
- ▶ The student's successful completion of the Science Option courses constitutes the basis for the Comprehensive Assessment in the Science Program, which is required by the Ministry of Education.
- ▶ OOUV, to apply the experimental method in a scientific field, is met throughout the Science Program.

MINISTERIAL SCIENCE PROGRAM OBJECTIVES

In all colleges, the Science Program includes 9 required and 3 optional Science courses. It also includes English, French, Humanities, Physical Education and complementary courses. The program is organized according to objectives to be attained in each course.

The following is a list of the Ministerial program objectives linked with Science courses.

OOUK	To analyze the organization, functioning and diversity of living beings.
OOUL	To analyze chemical and physical changes in matter using concepts associated with the structure of atoms and molecules.
OOUM	To analyze the properties of solutions and reactions in solutions.
OOUN	To apply the methods of differential calculus to the study of functions and problem solving.
OOUP	To apply the methods of integral calculus to the study of functions and problem solving.
OOUQ	To apply the methods of linear algebra and vector geometry to problem solving.
OOUR	To analyze various situations and phenomena in physics using the basic principles of classical mechanics.
OOUS	To analyze various situations and phenomena in physics using the basic laws of electricity and magnetism.
OOUT	To analyze various situations or phenomena associated with waves, optics and modern physics using basic principles.
OOUU	To apply acquired knowledge to one or more subjects in the sciences.
OOUV	To apply the experimental method in a scientific field.
OOXU	(Optional) To analyze the structure and functioning of multi-celled organisms in terms of homeostasis and from an evolutionary perspective.
OOXV	(Optional) To solve simple problems in organic chemistry.

**JOHN ABBOTT COLLEGE
SCIENCE 200.B0
PROGRAM PLANNER
STUDENTS ENTERING CEGEP IN FALL 1999 OR LATER**

<i>1st Semester</i>		<i>2nd Semester</i>	
603 ENGLISH 345 HUMANITIES 109 PHYSICAL EDUCATION ____ - ____ Complementary Course		603 ENGLISH 602 FRENCH 345 HUMANITIES 109 PHYSICAL EDUCATION	
<i>and</i>		<i>and</i>	
201-NYA-05 Calculus I 202-NYB-05 Chemistry of Solutions 203-NYA-05 Mechanics		Three of the following: 201-NYB-05 Calculus II 101-NYA-05 General Biology I 202-NYA-05 General Chemistry 203-NYB-05 Electricity & Magnetism	
<i>3rd Semester</i>		<i>4th Semester</i>	
603-__ ENGLISH 345-__ HUMANITIES 109 PHYSICAL EDUCATION		603 ENGLISH 602 FRENCH ____ - ____ Complementary Course	
<i>and</i>		<i>and</i>	
One of the following not taken in the second semester 101-NYA-05 General Biology I 202-NYA-05 General Chemistry 201-NYB-05 Calculus II 203-NYB-05 Electricity & Magnetism		Remaining 3 Science courses ____ - ____ Science Option course (see list)* ____ - ____ Science Option course (see list) * ____ - ____ Remaining Science Option or Required course)	
<i>and</i>			
Two of the following: 201-NYC-05 Linear Algebra I <i>or</i> 203-NYC-05 Waves Optics & Modern Physics <i>or</i> ____ - ____ Science Option course (see list)*			

* Refer to Science Option Chart for Choices

Complementary courses :

Please refer to the Schedule of Classes for Rules / Restrictions on Complementary Courses.

Students will be required to pass an English Exit Exam and a Program Comprehensive Assessment

SEQUENCE OF COURSES BY DISCIPLINE

DISCIPLINE	COURSE TITLE	PRE-REQUISITE	CREDITS	Objective
Biology				
Required Courses 101-NYA-05	General Biology I	-	2.67	00UK
Option Courses 101-DCN-05 101-DDB-05 101-DDM-05	General Biology II Human Anatomy & Physiology Human Genetics	101-NYA-05 101-NYA-05 101-NYA-05	2.67 2.67 2.67	00XU/UU 00UU 00UU
Chemistry				
Required Courses 202-NYB-05 202-NYA-05	General Chemistry I General Chemistry II	- 202-NYB-05	2.67 2.67	00UM 00UL
Option Courses 202-DCP-05 202-DDB-05 202-DDC-05 202-DDM-05 202-DDN-05 202-DDP-05	Organic Chemistry I Organic Chemistry II Physical Chemistry The Chemistry of Winemaking The Chemistry of the Environment & the Marketplace Forensic Chemistry	202-NYA-05 202-DCP-05 202-NYB-05 & 202-NYA-05 202-NYB-05 & 202-NYA-05 202-NYB-05 & 202-NYA-05 202-NYB-05 & 202-NYA-05	2.67 2.67 2.67 2.67 2.67 2.67	00XV/UU 00UU 00UU 00UU 00UU 00UU
Earth and Ocean Science				
Option Courses 205-DDB-05 205-DDN-05	Earth's Dynamic Systems: Earth, Oceans, Atmosphere Introduction to Oceanography	202-NYA-05 & 203-NYB-05 202-NYA-05 & 203-NYA-05	2.67 2.67	00UU 00UU
Mathematics				
Required Courses 201-NYA-05 201-NYB-05 201-NYC-05	Calculus I Calculus II Linear Algebra I	- 201-NYA-05 201-NYA-05	2.67 2.67 2.67	00UN 00UP 00UQ
Option Courses 201-DDB-05 201-DDC-05 201-DDD-05	Calculus III Linear Algebra II Statistics	201-NYB-05 201-NYC-05 201-NYA-05	2.67 2.67 2.67	00UU 00UU 00UU
Physics				
Required Courses 203-NYA-05 203-NYB-05 203-NYC-05	Mechanics Electricity & Magnetism Optics & Modern Physics	- 203-NYA-05 201-NYA-05 & 203-NYB-05 (203-NYB-05 may be taken concurrently)	2.67 2.67 2.67	00UR 00US 00UT
Option Courses 203-DDB-05 203-DDC-05 203-DDM-05 203-DDN-05	Physics for Engineers Astrophysics Astronomy The Physics of Sports	201-NYA & 203-NYB or 203-NYC 201-NYA-05 & 203-NYA-05 203-NYA-05 203-NYA-05	2.67 2.67 2.67 2.67	00UU 00UU 00UU 00UU

Options offered may vary from semester to semester
Objective 00UV, To apply the experimental method, is partially attained in every Science course.

COMPREHENSIVE ASSESSMENT IN THE SCIENCE PROGRAM

The Ministry of Education requires every student to pass a “Program Comprehensive Assessment” in order to obtain a CEGEP diploma. The Ministry introduced this requirement because it recognized the importance of connecting the various components within each program. The Comprehensive Assessment establishes whether or not a student fulfills the goals of the Science Program Exit Profile by providing an overall assessment of a student’s achievement of these goals.

Rather than impose a special exam at the end of the term or require a paper in addition to regular course work, John Abbott has integrated the Comprehensive Assessment in Science into the Science Option courses. Meeting the Comprehensive Assessment and Integrating Activity requirements of the program will be a focus of all science option courses by assigning them competency 14 from the Science Exit Profile (***To apply what has been learned to new situations***) and objective OOUU from the Ministerial Science Program Objectives. (***To apply acquired knowledge to one or more subjects in the sciences.***) It is not the intention that every option course meet all the criteria of objective OOUU or competency 14, but rather any combination of three option courses will meet the criteria to an acceptable level.

Objective **OOUU** most clearly embodies the requirements of both PCA and IA. The general competence is “to treat one or more subjects in the area of the natural sciences, applying knowledge that has been acquired”. This provides an opportunity for integration of what a student has acquired during the program (IA). The elements of this competency point clearly to its use for PCA, namely “to recognize the contribution of more than one scientific discipline in certain situations”, “to apply a scientific method”, “to solve problems”, “to use information technology”, “to reason with rigor”, “to communicate clearly and precisely”, “to demonstrate individual learning in the choice of appropriate documentation and laboratory equipment”, “to work in a team”, and “to establish links between science, technology and the evolution of society.” These elements are both taught and assessed throughout the Science Program such that students are prepared to meet the CA and IA requirements of the Science Option courses.

In summary, students are introduced to the Program Approach and the goals of the Science Program in the first semester, to all the required competencies during the remaining science compulsory courses (either directly through projects or indirectly through course material) and then more explicitly assessed with respect to Exit Profile goals via the integrative and summative activities of the Science option courses.

SCIENCE PROGRAM EXIT PROFILE (200.B0)

- 1) The John Abbott College Science Program graduate will have demonstrated mastery of the knowledge and skills of a basic scientific education as detailed in the list of outcomes below.
- 2) Moreover, the John Abbott College Science Program graduate will have mastered the knowledge and skills of a basic general education as detailed in the objectives of the General Education courses.

OUTCOMES	STANDARDS
3) <i>To apply the scientific method</i>	3.1 Appropriate powers of observation <ul style="list-style-type: none"> ▶ pattern recognition ▶ knowing what to look for ▶ perceiving what is important 3.2 Appropriate use of observations, measuring instruments and computers to collect data. 3.3 Appropriate use of experimental techniques of each of the scientific disciplines 3.4 Awareness of the experimental techniques that are common to the science disciplines. 3.5 Experimentation with sufficient care to obtain reliable results. 3.6 Correct use of common scientific instruments. 3.7 Appropriate compilation, organization and display of experimental data. 3.8 Rigorous analysis and interpretation of data. 3.9 Relevant conclusions based on the data and analysis

OUTCOMES	STANDARDS
<p>4) <i>To apply a systematic approach to problem solving</i></p>	<p>4.1 Problem solving using the techniques of each of the scientific disciplines</p> <p>4.2 Problem solving requiring techniques and ideas from more than one discipline.</p> <p>4.3 Analysis of complex scientific problems.</p> <ul style="list-style-type: none"> ▶ selection of the principles that apply to the problem ▶ selection of the relevant formulae and mathematical tools that apply to the problem. ▶ translation of the written description of a problem situation into the appropriate mathematical, graphical, vectorial and diagrammatic representation. ▶ accurate solution of the mathematical equations that arise in problems. ▶ interpretation of the scientific meaning of the mathematical solutions ▶ evaluation of the solution in terms of the stated objectives of the problem. ▶ logical presentation of the solution with clear delineation of the different steps
<p>5) <i>To use appropriate data processing techniques</i></p>	<p>5.1 Proper manipulation of a computer by an operating system.</p> <p>5.2 Correct use of a word processor and a spreadsheet to produce essays and laboratory reports.</p> <p>5.3 Correct use of a computer for data collection and analysis</p> <p>5.4 Appropriate use of computer programs and algorithms.</p> <p>5.5 Appropriate use of symbolic manipulation and function graphing programs.</p> <p>5.6 Use of the internet as a communications and research tool</p>
<p>6) <i>To reason logically</i></p>	<p>6.1 Analysis and evaluation of information and ideas.</p> <p>6.2 Appropriate choice of a model for a given situation</p> <p>6.3 Organization of ideas into a logical sequence.</p> <p>6.4 construction of a coherent argument, a rationale and a proof.</p> <p>6.5 Application of inductive and deductive reasoning to scientific work.</p> <p>6.6 Appropriate use of critical thinking and mental discipline.</p>

OUTCOMES	STANDARDS
7) <i>To communicate effectively</i>	<p>7.1 General literacy in English and French at the appropriate first and second language levels respectively.</p> <p>7.2 Demonstration of scientific literacy at the appropriate level.</p> <p>7.3 Completion of a literature search at the appropriate level</p> <p>7.4 Demonstration of understanding of science in the media</p> <p>7.5 Communication, orally or in writing, of scientific ideas and results:</p> <ul style="list-style-type: none"> ▶ the ability to write an essay on a scientific subject, ▶ the ability to write a laboratory report, ▶ the ability to relate scientific information to their peers.
8) <i>To learn in an autonomous manner</i>	<p>8.1 Self-evaluation of educational needs.</p> <p>8.2 Location, organization and use of relevant information.</p> <p>8.3 Evaluation of the effectiveness of learning strategies and adaptation and re-adjustment of objectives and behaviours as required.</p> <p>8.4 Ability to pursue studies in a concentrated manner.</p>
9) <i>To work as a member of a team</i>	<p>9.1 Organization of a cooperative group</p> <p>9.2 Ability to share equally in the work of a group.</p> <p>9.3 appropriate support and encouragement of team members.</p> <p>9.4 Constructive resolution of interpersonal conflicts</p>
10) <i>To recognize the links between science, technology and the evolution of society</i>	<p>10.1 Understanding of the relationship between theory and experiment and the relationship between science and technology</p>
11) <i>To develop a personal system of values</i>	<p>11.1 Appropriate identification and selection of personal values.</p> <p>11.2 Appropriate reference to ethical considerations and a system of values in decision making.</p>
12) <i>To put in context the emergence and development of scientific concepts.</i>	<p>12.1 Placement of the basic theories of science in their proper historical context.</p> <p>12.2 Appropriate demonstration of how application of the scientific method transforms and changes scientific theories and concepts.</p>

OUTCOMES	STANDARDS
<p>13) <i>To display attitudes and behavior compatible with the scientific spirit and method.</i></p>	<p>13.1 Knowledge of the philosophical and ethical bases of scientific work.</p> <p>13.2 Clear explanation of the social and ethical implications of scientific work.</p> <p>13.3 Awareness of appropriate standards of conduct;</p> <ul style="list-style-type: none"> ▶ respect for the ideas of others; ▶ distinction between quotation, citation and plagiarism; ▶ respect for the limitations and integrity of experimental data.
<p>14) <i>To apply what has been learned to new situations.</i></p>	<p>14.1 Clear explanation of the connections between courses in the same discipline.</p> <p>14.2 Clear explanation of the links between the various disciplines of the program.</p> <p>14.3 appropriate application of knowledge and techniques from the Fvarious disciplines of the new program to new situations.</p>