

John Abbott College Science Program 200.BO
Course Outline (Plan d'Étude)
Biological Marine Science (101-DDJ)

A. GENERAL INFORMATION

Program:	Science
Course Number:	Biology 101-DDJ-05
Title:	Biological Marine Science
Objectives:	00UU, 00UV
Ponderation:	3-2-3
Credits:	2 2/3
Prerequisite:	Biology 101-NYA
Semester:	Winter Intersession 2020
Teachers:	J.P. Parkhill AME-312 Ext. 5463 Christian Levesque AME-311 Ext. 5732

Lectures and labs: See Itinerary for schedule.

Instructor availability: Will be communicated to the students.

B. INTRODUCTION

This Biological Marine Science Course (101-DDJ) taught at the Roatan Institute of Marine Science in Anthony's Key, Roatan, Honduras offers an intensive 2-week long practical and applied approach to science. This course is a Science option course offered at intersession in late December and early January. The Course is field oriented and provides substantial experience in applications within Biological and Environmental disciplines. Classes will be small (24 students per course), allowing a great deal of student-teacher interaction. It is specifically designed to fulfill the requirements of objectives 00UU, and 00UV.

To create this intensive learning experience, and to allow the flexibility for substantial fieldwork, students will be given a foundation in Marine Science both in the classroom and in the field throughout each day (6-8 hours). Prior to departure to Belize, the students will have lectures on basic Marine Biology, and undergo training in proper sampling techniques, experimental design, and data analysis. Assessment will be based on the students understanding, laboratory and field research, as well as their ability to assimilate their results and effectively communicate their scientific findings in a cohesive and concise research report.

COMPREHENSIVE ASSESSMENT AND INTEGRATION IN THE SCIENCE PROGRAM:

The Ministry of Education requires every student to pass a program comprehensive assessment and a program integrating activity (Exit Profile Competency 14: "to apply what has been learned to new situations" and Ministry objective 00UU: "to apply acquired knowledge to one or more subjects in the sciences"). The Ministry introduced these requirements because it recognized the importance of connecting the various components within each program.

The various competencies to be addressed in the Science Program are outlined in the outcomes and standards of the Science Program Exit Profile and are listed below. They are divided into two groups: those

competencies that are taught and assessed in virtually every course in the program, and those that will be the primary focus of the option courses.

The following competencies are taught and assessed in most courses of the program:

3. ***To apply the scientific method.***
4. ***To apply a systematic approach to problem solving.***
5. ***To use appropriate data processing techniques.***
6. ***To reason with rigour, i.e. with precision.***
8. ***To learn in an autonomous manner.***
13. ***To display attitudes and behaviour compatible with the scientific spirit and method.***
14. ***To apply what has been learned to new situations.***

The following competencies will be the special focus of the option courses of the program. This course (101-DDJ) is one of these option courses.

7. ***To communicate effectively.***
9. ***To work as a member of a team.***
10. ***To recognize the links between science, technology and the evolution of society.***
11. ***To develop a personal system of values.***
12. ***To put into context the emergence and development of scientific concepts.***

Rather than impose a major exam or paper at the end of the Science Program, or requiring a single course to fulfill these requirements, John Abbott College has integrated the fulfillment of these requirements into the option courses taken later in the program. These courses have been designed so that by passing any three option courses a student will have met the above requirements of the program.

C. COURSE OBJECTIVES

OBJECTIVES	STANDARDS
<p>Statement of the Competency Objective 00UU:</p> <p>To apply acquired knowledge to one or more subjects in the sciences</p> <p><u>Elements of the Competency</u></p> <ol style="list-style-type: none"> 1. To recognize the contribution of more than one scientific discipline to certain situations. 2. To apply the scientific method 3. To solve problems. 4. To use data processing technologies. 5. To reason logically. 6. To communicate effectively 7. To show independent learning in their choice of documentation or laboratory instruments 	<p>General Performance Criteria:</p> <ol style="list-style-type: none"> 1. Use of an interdisciplinary approach. 2. Consistency and rigour in problem-solving and justification of the approach used. 3. Observance of the experimental method and, where applicable, the experimental procedure. 4. Clarity and precision in oral and written communication. 5. Correct use of the appropriate data-processing technology. 6. Appropriate choice of documents or laboratory instruments. 7. Significant contribution to the team 8. Appropriate connections between science, technology and social progress

OBJECTIVES**STANDARDS**

- 8. To work as members of a team.
- 9. To make connections between science, technology and social progress

**Statement of the Competency
Objective 00UV:**

To apply the experimental method in a scientific field.

Elements of the Competency

- 10. To represent various situations, drawing upon relevant concepts, laws and principles of science
- 11. To solve problems using a method proper to science.
- 12. To apply techniques of experimentation or validation specific to science.

General Performance Criteria:

- 1. Proper use of concepts, laws and principles
 - 2. Rigorous application of concepts, laws and principles.
 - 3. Appropriate use of terminology.
 - 4. Correct representation in a drawing or graph or in mathematical form.
 - 5. Consistency and rigour in problem solving, and justification of the approach used.
 - 6. Observance of the experimental method and, where applicable, the experimental procedure.
 - 7. Justification of the approach used.
 - 8. Assessment of the plausibility of the results.
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Specific performance criteria: This course provides a comprehensive hands-on examination of common marine inhabitants while exploring the exciting world beneath the waves. Subjects covered in this unique educational experience are stated in section E. Course Content.

D. EVALUATION PLAN

The purpose of evaluation is to determine how well students meet the course objectives.

• Class tests	20%
○ 2 tests of equal weight	
• Lab assignments	38%
○ Snorkeling exercise: 4% (Due Jan 9)	
○ Bathymetry: 5% (Due Jan 6)	
○ Fish Anatomy: 6%	
○ Wave and Beach Processes: 6%	
○ Invertebrates - Plankton Tow: 6%	
○ Oceanographic Sampling: 6%	
○ Seagrass Growth: 5%	
• Independent project	26%
○ Fish survey: 5%	
○ Microplastics Exercise: 5%	
○ Independent lab exercise: 6%	
○ Flora and Fauna of Belize: 10%	
• Participation	16%
○ T-Shirt Design: 1%	
○ GPS exercise: 1%	
○ Historical figure: 2%	
○ Trip participation: 2%	
○ Fish ID quiz: 3%	
○ Coral Quiz 2%	
○ Communication Video: 5%	
Total	100%

Comprehensive assessment: the independent project serves as the comprehensive assessment module for this option course.

E. COURSE CONTENT

Lecture topics

- An introduction to marine sciences with emphasis on the ocean basins, waves, tides, near-shore processes, the physical and chemical nature of seawater, circulation, and characteristics of marine plant and animal communities in the open ocean, coastal, and coral reef environments.
- How organisms deal with the marine environment. Interrelationships among animals, plants, and physical and chemical aspects of the environment will be studied, with stress on adaptations for survival, which are unique to the marine environment. Investigation of marine ecological concepts, and factors involved with reproduction, migration, and dispersal of marine life.
- An introduction to the physiology of marine organisms utilizing a comparative approach. The course will introduce the topics of respiration, circulation, metabolism, osmoregulation, thermoregulation, locomotion, and sensory systems by drawing comparisons between the mechanisms and strategies utilized by a wide range of marine organisms.

- Important marine taxonomic groups and processes will be investigated across a diverse landscape of aquatic habitats including open ocean, deep sea, benthic, and coastal ecosystems such as coral reefs, seagrasses, mangroves, and estuaries.
- A study of coral reef structure, formation, types, and the relationships of reef organisms to their environment. Emphasis is given to species diversity, identification, symbioses, and effects of temperature, salinity, light, nutrient concentration, predation, and competition on the abundance and the distribution of coral reef organisms.
- Aspects of human impact upon the marine environment and the management and conservation of marine resources. Learn the principles making the ocean a special place for life, and why sea life shows major, fascinating differences from that on land.
- Proper experimental design, data analysis, and experimental method will be explored for development of independent laboratory projects.
- Biogeochemical processes and cycles and importance of global and environmental systems are investigated.

Lab exercises

Students' exercises will reinforce the lecture material and investigate the dynamic marine environment by working in the field, on board a small research vessel, and in the laboratory to employ standard oceanographic instruments and sampling devices to develop a comprehensive knowledge about the delicate nature of this Caribbean marine environment. These experiments and exercises will adhere to an experimental method and experimental design, while promoting independent projects and team work.

The topics to be addressed in the laboratory exercises include:

- Underwater sampling techniques including photography, survey methods, estimating population parameters, and data processing.
- Comprehensive coral reef survey and mapping.
- Documenting environmental variables with *in situ* sampling, and laboratory and field experiments to determine rate processes.
- Estimating fish diversity and population size and determining the environmental factors affecting population parameters.
- Day and night time plankton tows for food web dynamics, taxonomy and diversity, with emphasis on diurnal variability.
- Intertidal zone, longshore current and beach formation investigation exercise.

F. REQUIRED TEXTS AND COURSE COSTS

1. Textbook: Students will be provided with the field guide Marine Life of the Caribbean Sea, 6th edition.
2. Lab Manual: Students are required to print the Biological Marine Science Lab Manual (2020), available online.

The cost inherent to the field component of this course will be communicated to the students by the International Programs Office.

H. TEACHING METHODS:

Prior to the Field program:

1. The students will be taught basic concepts and laboratory procedures, and receive an overview of the course material so that they can function effectively during their field work in Belize.

During the Field program:

1. Classroom sessions; two 80-minute sessions will normally be given each morning prior to the lab activities in the afternoon. These sessions will usually consist of lectures covering most of the theory of the course. This material will be tested in the unit tests and will be re-inforced in the laboratory setting. Coming fully prepared to each classroom session is a basic requirement for your success in this course.
2. Laboratory sessions; 3-hour sessions will normally be held each afternoon although sampling times and lab work will be dependent on the experiment being run. Independent projects within teams will allow each individual to focus on different research questions, while still maintaining an intensive sampling schedule. You must study the relevant lab exercises and attend the information seminars prior to the independent sampling projects outlined in the course. A firm grasp of the concepts is a must if you hope to be successful in the experiments and the experience. A short pre-lab instruction and/or quiz may be given and you must therefore arrive promptly for each lab. Students are encouraged to ask questions in both lectures and laboratories.

Following the Field program:

1. Students will spend time analyzing and assimilating the data that they collected during their field work, and will communicate these findings after their return from Belize.

I. DEPARTMENTAL POLICIES

1. Attendance at all lectures and laboratories is compulsory.
2. No rewrites will be provided for tests or quizzes. This includes the final exam which is typically held on the last day of the final exam period.
3. An absence from a scheduled test requires a doctor's note (or equivalent) to excuse the student. Otherwise a mark of "0" is assessed on the evaluation. Any relevant documentation must be submitted immediately upon the student's return to school.
4. Tests will be set at least one week after completing the relevant section or unit. An exception may be made at the end of the semester. These dates cannot be changed because of other tests in other courses given on the same date.
5. Having more than one test (in different courses) scheduled on the same day is not considered justification for an individual test sitting.
6. No re-balancing of evaluations as to the proportion of the final grade they comprise will be done.
7. No "make up" work will be given at any time during the semester or at its end to raise a student's mark.
8. The use of cell phones or similar devices in the classroom is prohibited at all times. Permission to utilize laptops in class will be at the discretion of the individual teacher.
9. No video or audio recording is allowed during lectures and labs without express permission from your instructor.

All students must write the unit tests and submit the assignments at the assigned times. A make-up will only be offered upon receipt of written medical proof of illness or equivalent.

J. COLLEGE POLICIES

Changes to Evaluation Plan in Course Outline (Article 4.3): Changes to the evaluation plan, during the semester, requires 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. *Please note that in the context of an intensive course (2 week duration), students must inform their instructor as early as possible to allow any possible accommodation during the course.*

Student Rights and Responsibilities (Article 3.2): It is the responsibility of students to keep all assessed material returned to them for at least one semester in the event of a grade review. (The deadline for a grade review is 4 weeks after the start of the next regular semester.)

Students have the right to receive the results of evaluation, for regular day division course, 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.

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.

PLAGIARISM is a form of cheating. It includes the intentional 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. It is the responsibility of teachers to show students (especially first semester students) how to paraphrase and cite and allow them to practice this skill.