

# Épreuve Synthèse for all Second Year Science Students W-2018

## What is the *Épreuve Synthèse du Programme*? (Comprehensive Program Assessment)?

This is a **mandatory** requirement for obtaining a diploma of collegial studies. You cannot graduate without completing an *Épreuve Synthèse*. When completed successfully, a passing grade for the *Épreuve Synthèse* will be entered on your record. In the Science program at Marianopolis College the *Épreuve Synthèse* will be in the form of an **interdisciplinary project** designed to show that the student has successfully attained the general goals of the Science Program.

The list of 24 Science Program Goals (together with brief definitions) is included on pages 8 & 9. While it is unlikely that all the program goals will be attained upon completion of your particular activity, a minimum number must be included, namely:

- The use of scientific vocabulary (#1).
- Autonomous work or teamwork (#12 or #13 or both).
- The application of knowledge to new situations (#23).
- The integration of more than one field of study (#24).

In addition to these goals your project must target **at least four** other goals from the list. These additional goals may be specified by your course instructor or by your project supervisor. You should be able to identify where and in what way these goals are involved in your program assessment activity, and hand in the completed **Self-Evaluation Form on Program Goals** (pages 7 to 9) with your project.

Another required component of the *Épreuve Synthèse* is that you write a special kind of summary, called a **descriptive abstract** on the integrative project that you have been assigned. The summary is to be word-processed and approximately 100-150 words in length. All necessary information on how to write this abstract will be provided to you. This abstract is to be submitted to the teacher responsible for your *Épreuve* who will grade it on a pass/fail basis.

## When do I need to complete an *Épreuve Synthèse*?

The *Épreuve Synthèse* must be completed in **your last** fall or winter term at the college. Any students intending to graduate this summer, including those taking summer school, must therefore complete their *Épreuve Synthèse* next term (W-2018).

## How do I complete my Épreuve Synthèse?

There are two main ways to complete your *Épreuve Synthèse* next term:

- Sign up for the lab project.
- Let the college automatically assign you a project based on a priority list.

This table below lists all the possibilities. It is a hierarchal list: the activities as the top of the list take precedence over activities lower in the list.

Table of Courses and Activities for the Épreuve Synthèse

1.	<b>Honours Science</b>
2.	<b>Robotics Engineering Team (Info on page 6)</b>
3.	<b>Science Fair (Info on page 7)</b>
4.	<b>The Lab Project (Info on page 5)</b>
5.	<b>PHY-LCV</b> – Digital Electronics
6.	<b>PHY-LCW</b> – Astrophysics
7.	<b>PRO- LCV</b> –Technical Drawing
8.	<b>BIO-LCV</b> – Human Physiology
9.	<b>BIO-LCW</b> – Molecular Genetics
10.	<b>CHE-LCV</b> – Organic Chemistry II
11.	<b>MAT-LCZ</b> – Differential Equations
12.	<b>MAT-LCY</b> – Finite Mathematics
13.	<b>MAT-LCW</b> – Probability and Statistics
14.	<b>PRO-LCU</b> – Computer Programming
15.	<b>BIO-LCU</b> – General Biology II
16.	<b>MAT-LCU</b> – Calculus III
17.	<b>PRO-LCW</b> – Advanced Computer Programming
18.	<b>Biology Presentation/Science Poster Session</b>

## How is the *Épreuve Synthèse* activity assigned?

There are three possible scenarios:

**Scenario 1** – You are participating in one or more of the top three activities (Honours Science, Robotics Engineering Team, Science Fair).

In this case, the highest activity on the list in which you are participating will count as your *Épreuve Synthèse* regardless of any other activity or course you are participating in.

**Scenario 2** – You are not participating in one of the top three activities and sign up for the lab project.

You will complete your *Épreuve Synthèse* in this activity regardless of any course you are participating in.

**Scenario 3** – You are not participating in any of the top three activities and do not sign up for the lab project

The college will **automatically** assign you to a project based on the list on page 2.

Some examples:

- You are an Honours Science student. The college will assign you to complete your *Épreuve Synthèse* through your Honours Research Project.
- You are part of the Robotics Engineering team and are participating in Science Fair. Since Robotics is higher on the list, the college will assign you to complete your *Épreuve Synthèse* in Robotics.
- You are taking one of the courses listed on page 2, but signed up for the lab project. The college will assign you to complete your *Épreuve Synthèse* in the lab project.
- You are taking BIO LCV and BIO LCW. The college assigns you to complete the *Épreuve Synthèse* in your BIO-LCV class as it is your highest course on the list.
- You are not currently taking any of the courses on the list. The college assigns you the biology presentation/science poster session since you have no other qualifying courses or activities.

## FAQ

**If I don't want to do the lab project, do I have to do anything right now?**

*No. Unless you sign up for the lab project, you will be automatically assigned a project in a specific course/activity based on the hierarchal list.*

**I am taking part in multiple courses/activities listed on page 2. Can I choose which course/activity I do my project in?**

*No. You will be automatically assigned a project based on the order in the list on page 2.*

**What is the format of the project in the listed courses?**

*It varies from year to year depending on the professor responsible for the activity.*

**When will I be contacted for my project?**

*Unless you are doing a special activity (#1-4), you will be only be contacted around March Break due to the course drop deadline. The teacher responsible for your course or activity will then inform you that you are completing the Épreuve Synthèse with them and will go over what you have to do for your project.*

**Can I choose between the biology presentation and poster presentation since I am taking no qualifying activities/courses?**

*If you belong to this category (#18), you will receive a MIO asking for your preference at around March Break.*

**I am participating in one or more of the first three activities but would be interested in gaining experience in a laboratory setting. Can I still sign up for the lab project?**

*Yes, but you will still be assigned the highest activity on the list as your Épreuve Synthèse. Priority will therefore be given to students not participating in activities 1-3 when assigning places in labs, and you will only receive a place if sufficient space is available.*

**If you have any other questions, please contact Jason Li in person or by MIO.**

# The Lab Project

The Lab Project gives students an opportunity to work in a professional setting. A variety of research labs and clinical facilities in Montreal have agreed to host Marianopolis students **during the March break** for 16 hours of hands-on experience. Anyone wishing to participate must complete the registration form at

[www.marianopolis.edu/thelabproject](http://www.marianopolis.edu/thelabproject)

Please note that space in specific research labs are limited so we may have to limit the number of students accepted according to your academic standing at the college. **Registration must be completed by the end of the day on January 30<sup>th</sup>**. To be eligible, you must be available for 2 days during the March break (between March 5<sup>th</sup> and March 9<sup>th</sup> 2018). We will be meeting during Activity Period in early February (date to be announced).

## Areas of research

The research facilities that participate can vary from year to year. Past participating labs have included:

- Analytical Chemistry
- Animal Cell Culture
- Architecture
- Bioinformatics
- Biosensor technology
- Cancer Research
- Cardiovascular research
- Civil Engineering
- Enzyme toxicology
- Human Genetics
- Human Genome project
- Mathematics
- Metallurgy
- Microbiology and Immunology
- Multidrug Resistance
- Nanoscience (Chemistry or Physics)
- Neurology
- Nursing
- Nutrition and dietetics
- Occupational Therapy
- Organic Chemistry
- Physiotherapy
- Protein Biochemistry
- Psychology
- Radiation Oncology
- Technology at Nortel
- Tissue and Organ Engineering
- Tropical medicine / Malaria
- Virology

**For specific questions regarding the lab project, please contact Claudia D'Abramo or Andrew Lefcoe by MIO.**

## Robotics Engineering Team

You may complete the *Épreuve synthèse* requirement as a current, participating member of the Robotics Team. All Team members are required to participate in the design and construction of a robot, and play an active role in the CRC Robotics Competition involving several hundred students from Montreal-region high-schools and CEGEPs. Participation in the Team incorporates many different competencies: mastery of engineering design and construction (mechanical and electrical), teamwork, programming, web-site creation, and video-graphic design. All work is supervised by a Science/Math faculty mentor. Additional training in the use of tools and machinery is provided by members of Marianopolis staff.

The Robotics Team is selected yearly, from a pool of worthy applicants recruited through the Robotics Club in September. The Robotics Team project covers a period of four months: one month of planning, two months of intense design and construction, one month of testing. The Robotics Competition is held in February.

All current team members in their final term are eligible to use this project to fulfill the *Épreuve synthèse* requirement. To qualify to use the project for the *Épreuve*, the student must be in good standing within the project, as deemed by the faculty mentor.

To complete the *Épreuve* requirement, the student must maintain good standing in the project to its completion. At the end of the project, the student will also be required to submit to the faculty mentor a satisfactory descriptive abstract of the student's contribution to the project, along with a self-evaluation of the student's fulfilment of the *Épreuve's* learning objectives through participation in the project.

Eligible Team members will be contacted by the faculty mentor in the first two weeks of the Winter Term.

If you are eligible for the *Épreuve* as a current, participating team member in your final term, and have not been contacted by the faculty mentor by February 16<sup>th</sup>, please contact one of the faculty mentors, Dominique Paradis or Hadi Bigdely.

## Science Fair

Participation in Marianopolis Science Fair provides an excellent opportunity to fulfill the *Épreuve Synthèse* requirement, while having good science fun and, possibly, winning prizes. You will work on one of three science projects (with a partner of your choice, if you so prefer): study, design or experimentation. You will also have the opportunity to work with an experienced scientist, either at the College (yes, we do have them!) or in an external laboratory. For students doing the Honours Science Certificate, it is possible to upgrade your Honours Research Project to a Science Fair project. It is also possible to build upon a previous science fair project from high school or CÉGEP.

The Marianopolis Science Fair will take place on February 15<sup>th</sup> 2018. Students who wish to participate in a Science Fair project as their *Épreuve Synthèse* must submit the following documents to the Science Fair Coordinator, Angela Keane.

1. Abstract (max. 300 words) + abstract assessment grid
2. Bibliography of all materials referenced and literature cited
3. Risk Assessment Form (for Experimentation and Design projects only)
4. Self-Evaluation form

For more information, please get in touch with Prof. Angela Keane.

# MARIANOPOLIS COLLEGE

## SCIENCE PROGRAM: OBJECTIVES & GOALS

### 1. SCIENTIFIC VOCABULARY

- To understand the technical and scientific vocabulary and use it correctly in oral and written communication

### 2. LAB SKILLS AND INSTRUMENTATION

- To be able to understand and use scientific instruments correctly in the laboratory, and present experimental data for analysis

### 3. GRAPHICAL REPRESENTATION

- To represent data and results graphically and be able to understand and interpret graphical information

### 4. OBSERVATION AND ANALYSIS

- To observe and gather data
- To make and test inferences based on the data, and confirm and evaluate the conclusions drawn

### 5. INDUCTIVE AND DEDUCTIVE REASONING

- To be able to reason from the particular to the general (inductive) and from the general to the particular (deductive)

### 6. USE OF MATHEMATICAL TOOLS

- To recognize the problems that can benefit from the use of calculus, algebra or other areas of mathematics
- To identify which technique is best suited for a given situation
- To apply the technique correctly

### 7. PROBLEM SOLVING APPROACH

- To identify relevant variables
- To break a problem into simpler components
- To choose the sequence to follow in solving the individual components
- To reach a conclusion

### 8. USE OF DATA PROCESSING TECHNOLOGY

- To be at ease with the use of computers to format reports and papers
- To gather and analyze data using spreadsheet software
- To use mathematical software

### 9. LOGICAL REASONING

- To be able to think through a situation using a systematic approach.
- To understand the difference between a hypothesis and a conclusion

### 10. ORAL COMMUNICATION

- To make an oral presentation of scientific material

### 11. WRITTEN COMMUNICATION

- To be able to read and understand scientific material
- To make a written presentation of scientific material



**12. AUTONOMOUS WORK**

- To develop independent study skills

**13. TEAM WORK**

- To develop the ability to cooperate with other individuals in a leadership, collaborative or supportive role
- To show respect for the other members of the team

**14. SCIENCE AND SOCIETY**

- To be sensitized to the implications of some scientific concepts, discoveries and theories to everyday life and environment, in a non-judgmental manner

**15. PERSONAL SYSTEM OF VALUES**

- To form one's own judgment on contemporary scientific issues
- To compare favorable versus unfavorable consequences of the implementation of scientific and technological developments

**16. HISTORICAL CONTEXT**

- To be familiar with the time frame and the state of culture at the time of a scientific discovery
- To identify the questions researchers were trying to answer when proposing new theories

**17. INTELLECTUAL CURIOSITY**

- To demonstrate intellectual curiosity
- To appreciate natural phenomena

**18. CRITICAL THINKING**

- To evaluate a theory, a result or any information on the basis of logic, knowledge, experience and common sense

**19. DEVELOPMENT OF INTUITION**

- To develop insight leading to an appropriate approach to new concepts and to problem-solving

**20. STIMULATION OF CREATIVITY**

- To develop inventiveness, inquisitiveness and originality

**21. CAPACITY FOR ABSTRACT THOUGHT**

- To develop the ability to conceptualize and visualize a situation or idea

**22. STRENGTHS AND LIMITATIONS OF SCIENTIFIC KNOWLEDGE**

- To understand the context in which a theory is valid, and recognize its limitations

**23. APPLY KNOWLEDGE TO NEW SITUATIONS**

- To extract knowledge from prior experience and transfer it to a new setting

**24. INTEGRATIVE ACTIVITIES**

- To establish links among two or more fields of study

MARIANOPOLIS COLLEGE

SCIENCE PROGRAM ÉPREUVE SYNTHÈSE

**SELF-EVALUATION FORM ON PROGRAM GOALS**

NAME (*Please print*) \_\_\_\_\_ ID # \_\_\_\_\_

ASSESSMENT ACTIVITY \_\_\_\_\_

SUPERVISING TEACHER: \_\_\_\_\_ DATE: \_\_\_\_\_

In the following table identify which Science Program Goals were relevant to your *Épreuve Synthèse*, and give a brief explanation or description in what way it met these goals. (Refer to the list of definitions of the Program Goals.)

PROGRAM GOALS	BRIEF EXPLANATION OF HOW YOUR ACTIVITY CONTRIBUTED TO MEETING THE PROGRAM GOALS
<b>1</b> Learning and use of scientific vocabulary	
<b>2</b> Acquisition and use of laboratory skills	
<b>3</b> Use of graphical representation	
<b>4</b> Ability to observe and analyze	
<b>5</b> Inductive/deductive reasoning	

<b>6</b> Use of mathematical tools	
<b>7</b> Problem solving	
<b>8</b> Data processing technology	
<b>9</b> Logical reasoning	
<b>10</b> Oral communication	
<b>11</b> Written communication	
<b>12</b> Autonomous work	
<b>13</b> Team work	
<b>14</b> Awareness of science and society	
<b>15</b> Development of a personal set of values	

<b>16</b> Appreciation of historical context of science	
<b>17</b> Stimulation of intellectual curiosity	
<b>18</b> Development and use of critical thinking abilities	
<b>19</b> Development of intuition	
<b>20</b> Stimulation of creativity	
<b>21</b> Development of abstract thought	
<b>22</b> Appreciation of the strengths/limitations of science	
<b>23</b> Application of knowledge to new situations	
<b>24</b> Integrative activities	

COMMENTS ABOUT THE OVERALL EXPERIENCE (Use reverse side or attach a sheet)