

# CANADIAN BIOLOGY OLYMPIAD 2019

The 2019 Canadian Biology Olympiad/Les Olympiades Canadiennes de Biologie (CBO/OCB) is a nation-wide organization involved in the selection of four secondary school students talented in the field of biological sciences to represent Canada at the International Biology Olympiad. Students are selected on the basis of a two round competition process (see below). The top four performing students in the CBO/OCB competition are invited to represent Canada at the 30<sup>th</sup> annual International Biology Olympiad (IBO) to be held in Szeged, Hungary in July 2019.

## A) Who can participate in the CBO/OCB competition?

- Competitors must be residents of Canada and Canadian Citizens or Landed Immigrants.
- Competitors are students of a regular secondary school for general education in Canada. In Quebec, first year CGEP students are also eligible to participate.
- Competitors have not obtained a diploma allowing them to study at a university or equivalent institution, before the 1<sup>st</sup> of January 2019.
- Competitors have not yet started study at a university or equivalent institution as regular or full time students.
- Competitors must be under the age of 20 as of July 1<sup>st</sup>, 2019.
- Competitors have not already participated in the IBO (can only participate once).

## B) Selection of the national team and participation in the IBO

In addition to the rules stated above:

- In accordance to the IBO rules, competitors cannot train for more than one week or do their portfolios in an Olympiad school or specialized school or study group of less than 50 students.
- Competitors cannot compete in another International Olympiad in the same year they are participating in the IBO.
- No school can have more than 2 members on the CBO team.
- At least 2 provinces should be represented.

## C) The National Competition

The CBO/OCB competition is a two round contest. Round one is the submission of a Skills Portfolio to test your lab skills (see details below). The second round is the University of Toronto National Biology Competition to test your theoretical skills. (<http://www.biocomp.utoronto.ca/about>). Please ensure you have your school registered for the University of Toronto Competition.

Final placing is based equally on the results from the Skills Portfolio and the University of Toronto competition. Team selection is made by the CBO Jury consisting of Biology Professors and Teachers. All decisions from the Jury are final.

The four selected students will be required to attend the CBO National Training Camp taking place a week before the international competition. The camp provides a unique experience for students to work alongside professionals in a variety of biology fields and develop laboratory skills through intensive hands-on activities. Please note that the camp is also open to other young biology enthusiasts who will train alongside the four selected students (check the National Training Camp tab on the web site for more information).

**Important dates:**

- The laboratory portfolio is due by April 18<sup>th</sup>, 2019.
- The University of Toronto Biology Competition exam is on April 25<sup>th</sup>, 2019.
- The National Skills Training Camp will be held from July 7 to 11, 2019 (details will be posted on the website).
- The IBO will be held in Szeged, Hungary from July 14 to 21, 2019.

**Cost:**

The cost for participating at the National Skills Training Camp and the IBO is of \$3,300.

# **LABORATORY SKILLS PORTFOLIO: CBO2019**

To be considered in the Canadian Biology Olympiad and National Team Selection, you must submit this Laboratory Skills Portfolio on or before **Thursday April 18, 2019** in digital format (flash drive to the address below). It is suggested that all students participating in the Canadian Biology Olympiad consider performing the experiments multiple times prior to completing the requirements for evaluation. Completing the tasks will improve laboratory skills for future studies in biology, even if you are not successfully selected for the team.

The skills portfolio is designed to select candidates best suited to compete at the International Biology Olympiad. The IBO is more than just a knowledge competition; competitors must possess lab skills and the ability to work under pressure. By creating this portfolio students are expected to demonstrate exemplary laboratory skills, and the ability to complete tasks within set parameters.

All work presented must be your own work and performed at your school. Make sure you do not work too closely with another student. Similarities between students' submission may be considered as plagiarisms and may result in disqualification. Also teachers or supervisors have to be careful not to coach or help their students with the portfolios. Please refer to the file Guidelines for Teachers for more information. Evidence of coaching from the teacher/supervisor may lead to the disqualification of the student. If a student cannot perform the portfolios at their school due to lack of specific equipment for example, he/she should seek approval with the CBO before commencing the work at the off-school campus. A teacher/supervisor must sign for authenticity and original work—see forms below. NOTE: the supervisor of your work **cannot** be a direct family member.

The portfolio is presented in advance so work on skills and development represents the student's true abilities and strengths. Please ensure the completed portfolio is received by the CBO on or before 23:59 April 18, 2019—in ONE package. It is advised to submit all work and forms on a single thumb drive with properly labeled files and folders. Files should be in pdf format and videos should be in mp4 format. If the documents are blank or cannot be read, there will be no contact to resubmit. So, please check that the files can be opened on a computer other than your own. Any portfolios arriving after 23:59 on April 18, 2019 will not be accepted—no extensions (this includes all student documents). Letters of reference from a teacher may arrive late, if the teacher has sent an electronic request prior to the deadline. Please note that the flash drive you submit will not be returned.

Note: A French translation of the Skills Portfolio is available upon request but the U of T exam is only available in English.

## **Submission of the Portfolio:**

You may perform tests/labs as often as you wish (to work on technique and mastery), but only one lab sample is to be submitted for each category. Please remember, at the International Biology Olympiad you will be expected to be able to complete a multitude of lab exercises independently under pressure and time constraints, so it is in your best interests to work on laboratory skills and be proficient in these. Note, the labs here are not necessarily the same labs you will encounter at the International Biology Olympiad—the IBO labs remain unknown until the competition begins.

The entire Skills Portfolio **MUST** be submitted to:

Dr. Sylvie Bardin  
Canadian Biology Olympiad  
UOIT Faculty of Science  
2000 Simcoe Street North  
Oshawa, ON, L1H 7K4

If you require clarification regarding the portfolio, please do not hesitate to ask.  
Questions are to be directed to: [admin@canadianbiologyolympiad.ca](mailto:admin@canadianbiologyolympiad.ca)

***Remember: The Lab Skills portfolio must be received on or before  
April 18, 2019***

## **The Portfolio must contain:**

**1. Personal Profile:** This is NOT part of the evaluation for the Canadian Biology Olympiad, but will describe you as the participant!

**2. Teacher Reference:** each candidate must submit a confidential teacher reference. Please ensure this letter is sealed in an envelope, with the teacher signature across the seal. Teachers are to include the following information in the reference letter:

- a. In terms of Biology knowledge and skills, how would you rate this individual?
- b. In terms of maturity for international travel and ambassador for Canada, can you cite any examples of this student's ability to be a role model at an international venue?
- c. Do you have any concerns about this student, such as social behaviours or other issues? Would you travel with the student on an international expedition? Why or why not?

### **3. Completed Activity for EACH category below (36 marks):**

**Category A:            Dissection**

**Category B:            Plant Biology**

**Category C:            Biochemistry**

## Category A: Animal Structure and Function: Dissection of a terrestrial worm (12 marks)

Objective:

- You will have to characterize the external and internal structures after dissection of a terrestrial worm.

Skills to demonstrate:

- Ability to effectively dissect a specimen in the time allotted.
- Ability to dissect out and show correct physiological details within the worm
- Use video and photo-assay to demonstrate your ability to identify and dissect the following structures:

**EXTERNAL FEATURES:** First explain how you would distinguish between the dorsal and ventral sides of your worm and then identify the following structures:

- prostomium (fleshy overhang above mouth)
- mouth
- metameres (somites)
- setae – view with dissecting microscope
- clitellum
- anus
- oviducts (paired ventral openings on somite 14)
- sperm ducts (small ventral openings on somite 15)

**INTERNAL FEATURES:**

• aortic arches	• gizzard
• dorsal blood vessel	• stomach
• pharynx	• intestine
• esophagus	• seminal vesicles
• crop	• septa

What must be submitted:

1. A maximum 10 minute uninterrupted video demonstrating your ability to identify and dissect the structures outlined above. You can take photos AFTER the video, but all dissection must be finished and completed in the 10 minutes allotted. Photos are to show your final product and NO additional dissection is permitted for photographs! You MUST be supervised by the person signing the lab cover sheet.
2. A Photo-essay (digital is fine) that demonstrates and shows labelled structures noted above. (NOTE: you may use a dissecting microscope to take photos, but NO additional dissecting is permitted to make a better picture! Any items dissected out for photographing must be out and set in the 10 min video allotment. The photos MUST be of YOUR dissected specimen from the video submitted.
3. Lab Cover sheet.

## **Category B: Plant Anatomy and Physiology Lab (12 marks)**

Objective:

Part 1: Demonstrating through slide preparation and a photo-essay the macroscopic and microscopic (seed, stem, leaf, root) differences between a Monocot and a Eudicot from seed to seedling with true leaves. Use corn (Monocot) and bean (Eudicot).

Part 2: Design and describe a method to generate data that demonstrates the differences in stomata densities, morphology, and arrangement (Morisita index) on Monocot and Eudicot true leaves that you have germinated. You must decide on a method, provide appropriately displayed and analyzed data, and include the raw data in an appendix. Write a discussion interpreting your results (100 – 300 words) and provide a word count. References are expected.

Skills to demonstrate:

- Successful germination and plant culture techniques.
- Proper sectioning techniques to demonstrate microscopic sections to show different features of the different plants.
- Proper techniques for observing and measuring stomata.
- Proper display of stomata results, and an effective use of statistics to demonstrate results as conclusive results.
- Ability to come up with a proper procedure to analyze the stomatal data

What must be submitted:

1. Cover Page for the activity.
2. For Part 1:
  - a. Photo-essay (if digital, save as a PDF): this photo essay is to include LABELLED photographs, demonstrating the macroscopic and microscopic differences between your seedlings and sections of the Monocot and Eudicot structures. These photos are to be of YOUR seedlings and sections and your ability to use a microscope! There is to be some text that explains the main differences between the growth forms of Monocots and Eudicots.
  - b. Prepare a 5 minute video (maximum) demonstrating your ability to hand section for preparation of your slides.
3. For part 2:
  - a. A maximum 2-page written report outlining your procedure for the stomata question. Please include the procedure, statistical analysis completed, and a written discussion that interprets your results.
  - b. You need to provide a couple of photos of YOUR prepared stomata slides that YOU made for the lab so that analysis of your results can be obtained.

## Category C: Turnip peroxidase (12 marks)

### Objective:

Determine the activity of turnip peroxidase for its substrate hydrogen peroxide using a colorimetric assay

### Skills to Demonstrate:

- Learn to measure enzymatic rate
- Ability to quantify concentrations using a spectrophotometer or other methods.
- Ability to graphically represent and interpret your data.
- Effectively communicate through graph and text the outcome of your lab exercise.

### What must be submitted:

1. Lab Cover Sheet.
2. A one page (maximum) outlining the protocol testing the effect of **three enzyme concentrations** on the activity of the turnip peroxidase enzyme. The protocol should be written in point form and may also include tables. Make sure you outline how data will be analyzed.
3. A 5-minute (maximum) video of you performing your experiment. The video should demonstrate your ability to effectively use instruments, equipment and key aspects of the procedure (such as the preparation of a blank, performing time course experiment, etc.). You may pause the recording of your experiment when procedures are being repeated but the video should show the key aspects of the complete procedure. You are not allowed to edit the video.
4. A graphical representation of the time course experiments as well as a graphical representation comparing the enzymatic rates at the three enzyme concentrations must be included in your results. These graphs are to be completed by hand, **DO NOT USE** a computer for this. **NOTE:** at the IBO graphs are often completed in a very strict time and must be done correctly by hand!
5. One page (maximum) summarizing the results obtained and explaining the results in terms of the mechanism of enzyme action and structure–function relationships involving biological protein molecules.





## Lab Cover Sheet

(print ONE for each submitted lab category—should have 3 in the portfolio—Category A, B and C)

Participant Name:			
School:			
Date Lab Was Completed:			
Lab Skills Category (circle/highlight):	A	B	C
Species/Organism Used: _____			
Name of videographer:			
List of Materials/stains/solutions/chemicals used (add to back if necessary):          			
<b><u>Teacher/Mentor Agreement</u></b>			
(must be signed by a supervising official—someone to verify that the work is the participant's)			
I, _____, the supervising teacher, confirm that the work presented/demonstrated with this cover sheet is _____ (name of student) personal's work. The report submitted represents this person's own writing and understanding. I also certify with my signature that this student completed the requirements as outlined in the objectives of the portfolio assignment.			
_____ Signature of Teacher		_____ Date	
_____ Position		_____ Contact Information (phone or email)	