

## **BIOC90 Course Syllabus – Fall 2020**

### **Integrative Multimedia Documentary Project**

#### **The Admin Team:**

Course Instructor: Dr. Jeneni Thiagavel [jeneni.thiagavel@utoronto.ca]

Course Supervisor: Dr. Rachel Sturge [rachel.sturge@utoronto.ca]

\*\*Please note: Dr. Thiagavel will be your main point of contact in BIOC90

**Course Website:** The main source of information for BIOC90 is the Quercus course page

#### **Program Requirement:**

Students must complete BIOC90 as a program requirement in order to graduate if they are enrolled in the most recent versions of programs.

It is up to students to decide when to enroll in BIOC90 (i.e. they do NOT need to take C90 this term), but please note that if students wait to enroll in C90 after completing all eligible C-level courses, they will still need to complete the project but will not be able to benefit from the grade earned.

To check whether BIOC90 is a degree requirement, students should consult degree explorer. Note: students who enrolled in programs prior to summer 2020 will most likely not need to take BIOC90, but can choose to do so and can benefit from the grade earned by applying it to one of the relevant C-levels.

#### **Course Objective:**

Students will work in groups to produce a documentary-style narrative [i.e. a 5-minute video] that relays scientific evidence on a topic of interest from one or more of the relevant C-level courses to a lay audience. This project needs to incorporate the perspectives from at least two of the C-level biology courses your group members are enrolled in.

The video should:

- Communicate research findings to a lay audience
- Distill interesting results from primary literature (focus of video)
- Create a story line that would capture the interest of the public
- Consider including (brief) interview clips

Please note that this project will be completed as a group. Groups will be randomly assigned.

## Evaluation:

Your final grade for this project will be based on both

- (i) The final product (video & script)
- (ii) A series of tasks that must be completed along the way

The entire project will be worth 10%. Students taking BIOC90 this Fall, will be able to apply the 10% to any **ONE** of the following courses (even if they are enrolled in more than one of these):

## Participating C-level Courses in Fall 2020:

BIOC12	Biochemistry I	Dr. Rongmin Zhao
BIOC20	Principles of Virology	Dr. Jeneni Thiagavel
BIOC32	Human Physiology I	Dr. Jason Brown
BIOC40	Plant Physiology	Dr. Greg Vanlerberghe
BIOC54	Animal Behaviour	Dr. Kamini Persaud
BIOC61	Community Ecology & Environ. Biology	Dr. Rachel Sturge

Using (i) this course syllabus and (ii) the information session held by the C90 course instructor covering the details of the project, students will need to decide whether they'd like to take BIOC90 this Fall.

-Taking BIOC90 this Fall: the student must enroll in it on ACORN. This must be done **by the course add/drop date**

-Not taking BIOC90 this Fall: no action is required

## Significance of the Project

Future scientists should be able communicate with the public, given the importance of public opinion and support for the future of fundamental biological research. Media sharing platforms such as YouTube and Instagram are now important ways in which scientists share the work that they do, and being able to convert scientific research into a format that the public can understand is an essential skill that scientists need to develop. In this project, students can use video as a medium to develop and practice communicating ideas to a broad audience.

## **Learning Outcomes**

### **At the end of this project, students should be able to:**

1. Critically analyze scientific evidence and formulate logical, scientific arguments
2. Mine, dissect and cite published scientific literature to support reasoning
3. Employ effective oral communication to engage a broad audience
4. Collaborate effectively with team members in all aspects of this project
5. Integrate ideas across sub-disciplines of biology to articulate a problem or concept

### Frequently Asked Questions:

<https://www.utoronto.ca/biosci/faq-biob90h3bioc90h3>

### **Office Hours:**

The course instructor will hold appointment-based office hours every Wednesday.

Each group can schedule a meeting by emailing the course instructor for a group one-on-one.

These meetings will be held virtually on Bb Collaborate. Please ensure that you have a working webcam and microphone for these meetings.

## Topics

### **BIOC12** [Dr. Rongmin Zhao's]:

1. Insulin structure and determination of insulin amino acid sequences in early days.
2. Green fluorescence protein (GFP) and structural differences between different fluorescent proteins.
3. Structural differences between fetal and adult haemoglobins and their roles in oxygen transport.
4. RNase A: structure and mechanism of action.
5. Trypsin activity and mechanism of trypsin inhibitors

### **BIOC20** [Dr. Jeneni Thiagavel's]:

1. Why does the flu love cold winters?  
*[Why is the flu virus more infectious during the cold, winter months? What effect does the temperature have on the virus' envelope? Why is the transfer from host to host easier when it is cold?]*
2. Missing SETD3 protein: a cure for the common cold?  
*[What is the impact on the replication rate of some viruses when the gene that codes for the SETD3 protein is knocked out? Can targeting this protein be a potential cure for the common cold?]*
3. Does the coronavirus that causes COVID-19 leave its victims noseblind?  
*[Do those individuals infected by SARS-CoV-2 lose their sense of smell? Are there cells in the olfactory epithelium that are particularly vulnerable to this infection? Are olfactory receptor neurons directly targeted?]*
4. Remdesivir: the light at the end of the COVID-19 tunnel?  
*[How effective is Remdesivir at reducing recovery times? Explain how the drug interferes with viral replication and discuss its potential & limitations.]*
5. Foe to friend: can adenoviruses be used to treat cancer?  
*[Can HAdV-52 be used to combat cancer? The virus binds to polysialic acid on its target cells-can this property be exploited to treat certain types of cancer?]*
6. The pandemic's fashion statement: how effective are fabric masks against the spread of the coronavirus that causes COVID-19?  
*[Fabric masks have become a popular means of reducing the COVID-19 spread. How effective are such cloth masks (as compared to surgical masks)?]*

**BIOC32** [Dr. Jason Brown's]:

1. Why don't we have a vaccine against everything?
2. Is exposure to aluminum really a risk factor for developing Alzheimer's Disease?
3. Are opioids more addictive than other drugs and, if so, why? What are the best alternatives to opioids for pain management?
4. Hear no evil? Can humans be harmed by sounds outside their hearing range?
5. Does scientific evidence support the keto diet?
6. What's our best chance for a male contraceptive pill?

**BIOC40** [Dr. Greg Vanlerberghe's]:

1. The role(s) of plant aquaporins.
2. Cyclic electron transport pathways in plant photosynthesis.
3. The biosynthesis of plant cell wall components.
4. Guard cell membrane transport systems.
5. Plant responses to water deficit.
6. How will rising atmospheric concentrations of carbon dioxide impact plant function?
7. The role(s) of plant phytochromes.

**BIOC54** [Dr. Kamini Persaud's]:

1. Evolutionary Psychology and Human Behavioural Ecology seek to test evolutionary hypotheses about the behaviour of the human animal. Some people say that the behaviour of humans cannot be studied in the same way as the behaviour of non-human animals. Explain how humans are just like other animals when it comes to explaining why we behave the way we do. Provide examples.
2. Explain the difference between male and female sexual behaviour when it comes to how they have been selected to best increase their fitness (in most species). In other words, why do males and females behave differently? Include reference to parental investment theory and operational sex ratio. Provide examples.
3. In many species, males have evolved elaborate traits and/or displays that are detrimental to their survival. Explain different reasons why such costly traits and/or displays have evolved. Be sure to include reference to Zahavi's Handicap Principal/Hypothesis. Describe why sexual selection is often distinguished from natural selection despite it *not* being a different type of selection.
4. Explain why the relationship between male and female animals is better characterized as one of conflict than "romance" or harmony. Include reference to male sexual coercion, female countertactics and chase-away selection.

5. Explain the concept of “evolutionary traps” and the role humans play in setting them. Provide examples, including at least one behavioural trap (a trapped behaviour of an animal.) What can be the consequences and how can they be prevented?

**BIOC61** [Dr. Rachel Sturge’s]:

1. Both positive and negative species interactions play a large role in community structure, especially with respect to community composition over the long term. Using examples, explore the effects of different types of interactions on the communities found in Ontario / in Canada / in North America (pick a scale that works for the story you are telling).

2. There are many different hypotheses to explain why tropical biodiversity is so much higher than biodiversity at higher latitudes. Explain to a lay audience why the tropics have so many species compared to other parts of the world by exploring some of these hypotheses [or even focus on the one(s) you like best!].

3. We are in the midst of a mass extinction event of our own making. Explore reasons for this, making sure to include a community ecology & environmental biology perspective in your video! (Hint: you might explore the impacts that could result from losses of essential ecosystem services, losses of keystone / foundational species that play a large role in their ecosystems, or through impacts to nutrient cycles and the effects this might have on important autotrophs / human food production).

4. Population dynamics are influenced by both deterministic and stochastic events. Explore some of the factors that influence population size over time, using case studies as examples. You can even tie this to the small population paradigm and extinction vortices if you wish to bring a conservation focus to this topic.

5. Predator population dynamics are heavily influenced by their prey, and in the absence of other species interactions predators and their prey often show stable population cycles. Predators can also play a large role in community dynamics because of their direct impact on their prey (and the indirect influences this can have on other species), and some predators are keystone species because of their ability to trigger trophic cascades. Explore some of these relationships using case studies.

6. Facilitation can have a large impact on community structure as a result of indirect interactions between the relevant species. Explore examples of facilitation using case studies. Make sure to include an exploration of the impact of indirect effects on community structure in your story.
  
7. The concept of metapopulation structure has had a large influence on conservation biology. Explore this concept, using case studies. Alternatively, answer the following question (using case studies): As more and more habitats become dominated by humans, how can metapopulation structure help us predict the future impacts of habitat loss on native biodiversity?
  
8. Species life history strategies result in tradeoffs based on which strategy will be the most successful. This includes such tradeoffs as competition versus colonization ability, tolerance versus fecundity, and possibly many more. Pick some tradeoffs that are of interest to you and explore the research support for (or against) their existence in nature.
  
9. Do metacommunities exist? If so, what impact do they have on community biodiversity? Explore this topic using case studies.
  
10. What are eco-evolutionary dynamics? How do they influence biodiversity and changes in biodiversity over the long term? Explore this topic, using case studies.

## Course Schedule

### Week 1 & Week 2 – Understand Expectations

- (i) Students access the BIOC90 Course Syllabus
- (ii) Students watch the information session posted by the course instructor
- (iii) Students decide whether they want to take BIOC90 this Fall
- (iv) Interested students should enroll in BIOC90 on Acorn before the course add/drop date

### Week 3 – Team up & Plan

- (i) Students are grouped into teams of seven students (by the EdTech team)
- (ii) Students e-meet their group members to discuss possible topics and titles for their video
- (iii) Complete and submit the ‘Team Planning Worksheet’ – will be available on Quercus, under Quizzes

**Group Submission of (iii) due: By 11:59pm on Sunday September 27<sup>th</sup>**

*Graded by the course instructor, for completion only [10% of assignment grade]*

### Week 4 – Topic Selection

- (i) Teams meet to finalize topic and title, and write a brief summary of overall plan
- (ii) Complete and submit this summary on Quercus, under Quizzes [‘Topic Selection’]

**Group Submission of (ii) due: By 11:59pm on Sunday October 4<sup>th</sup>**

*Graded by the course instructor, for completion only [10% of assignment grade]*

## **Week 5 & 6 – Work on Video Outline**

(i) Read the guides on citing images and videos – Available here:  
<https://guides.library.utoronto.ca/BIOC90>

Additional citation information can be found on the C90 Quercus Page, Under Modules [“Guide on Citing Images & Videos”]

(ii) Complete ‘Citation Quiz’ – will be available on C90 Quercus Page, under Quizzes

**Individual Submission of (ii) due: By 11:59pm on Sunday October 11<sup>th</sup>**

*Graded by the course instructor, for completion only [10% of assignment grade].  
Please note: you must pass this quiz in order to proceed. Multiple attempts will be provided.*

(iii) Create an annotated bibliography showing the research for their project

(iv) Complete an overall outline that includes a summary of the information that will be covered in video. For example:

- Storyboard
- Visuals
- Complete draft script for video narration
- Timeline of video: a plan for how the 5 minutes will be used
- Sample interview questions if an interview is planned
- Interviewees that have been identified by the group

In the information session posted by the course instructor, more details about this task will be provided to you.

Further, on the C90 Quercus Page, Under Modules, a guideline & some examples of storyboards will be posted [“Storyboard Guideline & Examples”].

## **Week 7 – Submit Video Outline**

(i) Submit annotated bibliography through Quercus [Assignment Submission]

(ii) Submit Video Outline through Quercus [Assignment Submission]

**Group submission of (i) & (ii) due: By 11:59pm on Sunday October 18<sup>th</sup>**

*Graded by the course instructor, for completion only [20% of assignment grade]. You will receive detailed feedback*

(iii) Submit 'Health Check-In' – will be available on C90 Quercus Page, Under Modules ["Health-Check In"]

**Individual submission of (iii) due: By 11:59pm on Sunday October 18<sup>th</sup>**

*Graded by the course instructor, for completion only*

### **Week 8-10 -Work on Video**

- (i) Use the feedback you received from the course instructor and work on your final video product

Under Modules 'Video Production Guidelines' have been posted which (includes a list of free software)

For those students including interview clips as part of their final video product, the following have been posted under Modules:

1. Interview Guidelines
2. Interview Consent Forms (**Required for final video to be graded**)

- (ii) Submit 'Health Check-In' – will be available on C90 Quercus Page, Under Modules ["Health-Check In"]

**Individual Submission of (ii) due: By 11:59pm on Sunday November 15<sup>th</sup>**

*Graded by the course instructor, for completion only*

### **Week 11 – Submit Video Documentary**

-Student groups must submit:

- (i) Final video [submit through Quercus [Assignment Submission] **and**

(ii) Final version of the entire script used to narrate the videos – submit through Quercus [Turnitin Assignment Submission]

**Group Submissions of (i) & (ii) due: By 11:59pm on Sunday November 22<sup>nd</sup>**

*Graded by the course instructor [50% of assignment grade]*

- (iii) Submit Group Participation Evaluation – will be available on C90 Quercus Page, under Quizzes

(iv) Submit Post-C90 Survey – will be available on C90 Quercus Page, under Quizzes

**Individual Submission of (iii & iv) due: By 11:59pm on Sunday November 22<sup>nd</sup>**

*Graded by the course instructor, for completion only. Please note: Students will all start with the 10%. From this, grades will be deducted for students that did not participate fully/groups that experienced a lot of issues.*

**Information Session – Posted by Course Instructor:**

It is highly recommended that you watch the information session posted by the course instructor (under Modules). Here, you will get more information on how to produce a good video documentary, how these videos will be graded, etc.