Genetic Incompatibility Lab Assessment

Start of Block: Introduction

Q79 The purpose of this short survey is to collect information regarding your experience participating in the Genetic Incompatibility Lab. This lab encompassed scoring strength of genetic incompatibility in *Campanula americana* hybrid seedlings and using long-read sequencing to assemble parental chloroplast genomes and determine the extent of structural variation between them. The goal was to determine if there was a relationship between the amount of structural variation and the strength of incompatibility. The information that you provide in this survey will be used to evaluate the design and implementation of the Genetic Incompatibility Lab experience, which will inform changes to future iterations as well as inform development of future modules focused on high-throughput sequencing in the classroom. Here, we begin by asking a set of questions to gather a little information about your academic and career background and experiences to better understand what students take away from the experience. Thank you in advance for your willingness to complete the following survey.

Q80 Select your current lab section

- ○ Monday 9:10 (1)
- ○ Monday 12:40 (2)
- ○ Tuesday 9:35 (3)
- ○ Tuesday 12:45 (4)
- ○ Tuesday 3:55 (5)
- ○ Wednesday 9:10 (6)
- ○ Wednesday 12:40 (7)
- ○ Wednesday 4:10 (8)
- ○ Thursday 9:35 (9)
- ○ Thursday 12:45 (10)

End of Block: Introduction

Start of Block: Education

Q40 The purpose of the first set of questions is to gather a little information about your educational and personal background and experiences.

Q45 What is your academic standing at JMU?

- ○ First-year/Freshman (6)
- ○ Second-year/Sophomore (1)
- ○ Third-year/Junior (2)
- ○ Fourth-year/Senior (3)
- ○ Other (please write in) (5) _____

Q38 Please select your current field of study (if not included, please type in the text box - and if multiple, please check all the appropriate boxes

- ☐ Biology (1)
- ☐ Biotechnology (2)
- ☐ Chemistry (3)
- ☐ Health Sciences (5)
- ☐ Other (7) _____

Q46 Did you transfer to JMU from another institution? (A transfer student is a student that attempted or completed 12 or more credits at another college or university AFTER high school graduation)

- ○ No, I began my career here at JMU (1)
- ○ Yes, I began my college career at a different 2-year institution (like a community college) (2)
- ○ Yes, I began my college career at a different 4-year institution (3)
- ○ Yes, I began my college career at another institution that does not fall into the other two categories above (please briefly describe in box) (4)

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Q94 Which of the following courses did you take at JMU?

- ☐ BIO 140 (1)
- ☐ BIO 150 (2)
- ☐ BIO 203 (3)
- ☐ None of the above (4)

Q84 Looking ahead after you complete your Bachelor's degree, what do you think is next in terms of schooling or work?

- ○ Not sure/undecided (1)
- ○ Graduate school in biology or biotechnology (2)
- ○ Graduate school in another science, technology, engineering, or mathematics (STEM) field (9)
- ○ Graduate school in a non-STEM field (3)
- ○ Health related professional school (such as medical or dental school) (4)
- ○ Non-health related professional school (such as law or business school) (8)
- ○ Job in a science or technology field (5)
- ○ Job in a non-science or technology field (6)
- ○ Job in informal or formal education (teaching, working at a museum, park naturalist, etc.) (10)
- ○ Other (please fill in) (7) _____

Q33 Have you participated in undergraduate research at JMU or elsewhere with a faculty member (outside of coursework)?

- ○ Yes (1)
- ○ No (2)

Q90 Have you had previous experience using bioinformatic programs (e.g. DNA subway, Phamerator, Emboss)?

- ○ None (1)
- ○ Some (2)
- ○ Extensive (3)

Q91 Have you had previous experience with coding (e.g. using Python, scripting commands, Rstudio, Observable)?

- ○ None (1)
- ○ Some (2)
- ○ Extensive (3)

Page Break

End of Block: Education

Start of Block: Cognitive Outcomes

Q83 The purpose of this next set of questions is to gather information about the impact of the Genetic Incompatibility Lab.

Q35 To what degree do you agree with the following statements? The in-class genetic incompatibility lab increased my conceptual understanding of…

	Substantially (1)	Moderately (2)	Very little (3)	Not at all (4)
The biological concepts of genetic incompatibility, reproductive isolation and speciation (1)	○	○	○	○
The structure and function of organelle genomes (2)	○	○	○	○
The technical side of how high throughput sequencing (NGS) works (4)	○	○	○	○

End of Block: Cognitive Outcomes

Start of Block: Behavioral Outcomes

Q85 To what degree do you agree with the following statements? The in-class genetic incompatibility lab has made me more interested in…

	Strongly Agree (1)	Agree (2)	No Change/Neutral (3)	Disagree (4)	Strongly Disagree (5)
Conducting future research utilizing high-throughput sequencing approaches (1)	○	○	○	○	○
Conducting future analyses utilizing command line scripting. (2)	○	○	○	○	○
Taking future courses at JMU that engage students in high-throughput sequencing or command line scripting (4)	○	○	○	○	○
Participating in independent research (outside of coursework) as an undergraduate student at JMU. (5)	○	○	○	○	○
Pursuing research opportunities following graduation. (6)	○	○	○	○	○
Pursuing a career related	○	○	○	○	○

to scientific research. (7)

Page Break

End of Block: Behavioral Outcomes

Start of Block: Affective Outcomes

Q60 The in-class genetic incompatibility module has increased my confidence in my ability to…

	Substantially (1)	Moderately (2)	Very little (3)	Not at all (4)
Explain the technical side of high throughput sequencing (How it works) (1)	○	○	○	○
Carry out advanced genetic techniques, such as next generation sequencing. (2)	○	○	○	○
Utilize command line functions and scripting (coding) (4)	○	○	○	○
Conduct bioinformatic analyses (5)	○	○	○	○
Explain how sequencing and assembling genomes works, from DNA extraction to computational analysis (6)	○	○	○	○

Page Break

End of Block: Affective Outcomes

Start of Block: Course Perceptions

Q63 The next short set of questions asks about your perspective of the module.

Q88 What is the greatest benefit that you gained from the module?

- ○ Germinating seeds on plates to observe the compatibility or incompatibility of population crosses (4)
- ○ Learning about and/or interacting with high-throughput sequencing technologies (5)
- ○ Learning how to prime and load a MinION flow cell (11)
- ○ Gaining experience with coding through the use of Google Colab notebooks (6)
- ○ Gaining greater insight into genetic concepts like speciation and cytonuclear incompatibility (7)
- ○ Gaining experience or familiarity with various bioinformatic programs (i.e. Bandage, Reputer, and/or Chlorobox) (8)
- ○ I had no beneficial gain (9)
- ○ Other: Please explain (10) _____

Q47 Please identify 1-2 aspects of the genetic incompatibility module that best supported your learning.

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Q48 What are 1-2 suggestions you have for instructors about the module to help improve student learning?

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End of Block: Course Perceptions

Start of Block: Demo Block

Q83 The set of questions focuses on participant demographics.

Q91 How old are you?

- 18-20 years (1)
- 21-23 years (2)
- 24-26 years (3)
- 27+ years (4)

Q86 To which gender do you most identify with?

- Male (1)
- Female (2)
- Nonbinary (3)
- Transgender (4)
- Prefer not to answer (5)
- Prefer to self-describe (6) _____

Q88 What is your Race/ Ethnicity?

- American Indian or Alaskan Native (1)
- Asian (2)
- Black or African American (3)
- Native Hawaiian or Other Pacific Islander (4)
- Hispanic or Latino/a/x (5)
- White or Caucasian (6)
- Prefer not to answer (7)
- Prefer to self-describe (8) _____

Q89 Are you a first generation college student? (A first-generation college student is defined as a student whose parent(s)/legal guardian(s) have not completed a bachelor's degree. This means that you are the first in your family to attend a four-year college/university to attain a bachelor's degree.)

- Yes, I am a first generation college student (1)
- Kind of - my older siblings were the first in my family to complete a college degree (2)
- No, I am not a first generation college student (3)
- Prefer not to answer (4)

Q90 Did you currently have a regular job?

- Yes, approximately (1)
- Yes, 5-10 hours per week (2)
- Yes, approximately >10 hours per week (3)
- No, I did not work on a regular basis (6)
- Prefer not to answer (7)

End of Block: Demo Block