

Supplemental Material

CBE—Life Sciences Education
Meyer *et al.*

Undergraduate Research Pre-Survey

Start of Block: Default Question Block

This survey is anonymous to your instructor and your instructor will not be able to identify you based on your responses. The purpose of this survey is to provide your instructor with your reflections on the research portion of this course so that they can see what you learned and continue to refine and improve the course. There is a pre and post survey. This is the pre survey and it is intended to get your initial opinions on scientific inquiry prior to doing research. Thank you for taking this survey.

Q12 Please write your first and last name.

Q1 What is your Student Identification Number (SID #)

Q2 Please select the current quarter.

- Fall 2018 (1)
 - Winter 2019 (2)
 - Spring 2019 (3)
-

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Q3 Who is your instructor?

Q4 What does it mean to think like a researcher?

Q5 When experts disagree on a scientific question, it is because they don't know all the facts yet.

- Strongly Disagree (1)
- Disagree (2)
- Agree (3)
- Strongly Agree (4)

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Q6 If an experiment shows that something doesn't work, the experiment has no value.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (3)
 - Strongly Agree (4)
-

Q7 Since nothing in science is known for certain, all theories are equally valid.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (3)
 - Strongly Agree (4)
-

Q8 I feel that I belong in a research-based course.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (3)
 - Strongly Agree (4)
-

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Q9 I can do well in research-based courses.

- Strongly Disagree (1)
- Disagree (2)
- Agree (3)
- Strongly Agree (4)

End of Block: Default Question Block

Undergraduate Research Post-Survey - Spring 2021

Start of Block: Default Question Block

Q1 This survey is **CONFIDENTIAL**. All data are collected by a third party and your instructor will not be able to identify you based on your responses. The purpose of this survey is to provide your instructor with your reflections on the research portion of this course so that they can see what you learned and continue to refine and improve the course. There is a pre and post survey. This is the post survey and it is intended to capture what you learned and experienced through doing research in this course. Thank you for taking this survey.

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Q2 Please write your name.

Last Name (4) _____

First Name (5) _____

Q3 What is your Student Identification Number (SID #)

Page Break _____

Q4 Please select the current quarter.

- Fall 2020 (1)
 - Winter 2021 (2)
 - Spring 2021 (3)
-

Q5 Who is your instructor?

Q6 What was the name of your course?

- CHEM161 (1)
- CHEM162 (2)
- CHEM163 (3)
- CHEM275 (16)
- BIOL108 (20)
- BIOL160 (4)
- BIOL211 (5)
- BIOL260 (19)
- BIOL275 (17)
- ENVS100 (21)
- ENVS295 (6)
- ENVS299 (18)
- ANTH208 (8)
- ANTH215 (12)
- PSYC100 (9)
- PSYC200 (14)
- POLS101 (15)

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Q7 Based on your experiences in this course, what does it mean to think like a researcher?

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Q8 What is the highest degree you intend to earn?

- No Degree (1)
 - Associates Degree (2)
 - Bachelors Degree (3)
 - Masters Degree (4)
 - PhD, MD or other Doctorate Degree (5)
-

Q9 I feel that I belong in a research-based course.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (3)
 - Strongly Agree (4)
-

Q10 I can do well in research-based courses.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (3)
 - Strongly Agree (4)
-

Page Break

Q11 How often did the following things occur in this course?

I contributed my ideas during class discussions (1)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)
I visited my instructor's office hours and/or met with the instructor outside of class (2)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)
I provided constructive criticism to classmates (3)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)
I sought input on how to address problems that I encountered during my investigation (5)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)

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Q12 How often did the following things occur in this course?

I had time to modify my approach or revise and repeat analyses based on feedback (8)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)
I revised and repeated work to account for errors or fix problems (17)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)
I made decisions on my own throughout the research process (10)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)
I worked closely with my peers while conducting my research project (12)	<input type="radio"/> Never (1)	<input type="radio"/> One or Two times (2)	<input type="radio"/> Three or Four times (3)	<input type="radio"/> Weekly (4)

Page Break

Q13 I felt supported by the instructor.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (4)
 - Strongly Agree (3)
-



Q14 I developed new conclusions based on data.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (3)
 - Strongly Agree (4)
-

Q15 I conducted an investigation to find something previously unknown to myself, other students and/or the instructor.

- Strongly Disagree (1)
 - Disagree (2)
 - Agree (3)
 - Strongly Agree (4)
-

Page Break

Q16 What is a personal strength or skill that you used to be successful in the research portion of this course? Please describe that strength or skill in 2-3 sentences.

Q17 Some of the skills I learned through doing research are useful in other areas of my life.

- Strongly Disagree (1)
- Disagree (2)
- Agree (3)
- Strongly Agree (4)



Q18 I felt I built a meaningful relationship with the instructor during this course.

- Strongly Disagree (1)
- Disagree (2)
- Agree (3)
- Strongly Agree (4)

Page Break



Q19 Having completed this course and your research project, how much did you improve in the following areas?

Interpreting results (Q19_2)	<input type="radio"/> None (1)	<input type="radio"/> Little (2)	<input type="radio"/> Some (3)	<input type="radio"/> Much (4)	<input type="radio"/> Extensive (5)
Analyzing data (Q19_3)	<input type="radio"/> None (1)	<input type="radio"/> Little (2)	<input type="radio"/> Some (3)	<input type="radio"/> Much (4)	<input type="radio"/> Extensive (5)
Collecting data (Q19_4)	<input type="radio"/> None (1)	<input type="radio"/> Little (2)	<input type="radio"/> Some (3)	<input type="radio"/> Much (4)	<input type="radio"/> Extensive (5)
Reading primary literature (Q19_5)	<input type="radio"/> None (1)	<input type="radio"/> Little (2)	<input type="radio"/> Some (3)	<input type="radio"/> Much (4)	<input type="radio"/> Extensive (5)
Communicating research results (Q19_7)	<input type="radio"/> None (1)	<input type="radio"/> Little (2)	<input type="radio"/> Some (3)	<input type="radio"/> Much (4)	<input type="radio"/> Extensive (5)
Troubleshooting in the research process (Q19_18)	<input type="radio"/> None (1)	<input type="radio"/> Little (2)	<input type="radio"/> Some (3)	<input type="radio"/> Much (4)	<input type="radio"/> Extensive (5)
Self confidence doing research (Q19_19)	<input type="radio"/> None (1)	<input type="radio"/> Little (2)	<input type="radio"/> Some (3)	<input type="radio"/> Much (4)	<input type="radio"/> Extensive (5)

Page Break

Q20 Was doing research a useful way to learn about the subject of your course? Why or why not? Please explain in 2-3 sentences.



Q21 What is the likelihood that you will seek out research opportunities or research-based courses again?

- Extremely likely (5)
- Somewhat likely (4)
- Neither likely nor unlikely (3)
- Somewhat unlikely (2)
- Extremely unlikely (1)

Q22

These questions will collect demographic data. The data will be compiled for analysis; no individual responses will be shared, including with instructors. This data will help ensure greater effectiveness in the Undergraduate Research Program at Bellevue College. Responses to these questions are optional and individual responses will not be shared.

Q23 How old are you currently?

- Less than 18 years old (1)
 - 18-24 years old (2)
 - 25-29 years old (3)
 - 30-34 years old (4)
 - 35-39 years old (5)
 - 40-44 years old (6)
 - 45-50 years old (14)
 - 50+ years old (15)
-

Q24 I identify as:

- Female (1)
 - Male (2)
 - Nonbinary (4)
 - Prefer to Self Describe (6) _____
-

Q25 I identify as:

- American Indian, Alaska Native, Indigenous, or First Nations (1)
 - Asian, Asian American, or Desi American (2)
 - Black or African American (3)
 - Hispanic or Latinx (4)
 - Middle Eastern or North African (5)
 - Native Hawai'ian or Pacific Islander (6)
 - White or European American (7)
 - Multiracial or Bi-Racial (9)
 - Prefer to Self Describe (8) _____
-

Q26 I am (select any that apply):

- Disabled (1)
- First in my family to attend college (2)
- A Running Start student (3)
- An international student/ Here on a student visa (4)
- Neurodiverse (5)
- A Veteran (8)

End of Block: Default Question Block

Discipline	Course Level	Description of the Project	Existing CURE	Length of Project	Group or Individual	Research Question	Data Collection	Presentation of the Research
Anthropology	Introductory	Students defined their own research question based on course content and selected one of three methods to collect data, including surveys, interviews, or participant observations.		Quarter-long	Individual	Student-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.
Biology	Introductory	Students developed their own hypothesis and tested the prevalence of antibiotic resistant bacteria in the environment.	Project was adapted from the PARE Project (https://sites.tufts.edu/ctse/pare/).	Quarter-long	Group	Instructor-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.
Biology	Majors	Students investigated epigenetic changes in corn DNA in response to environmental stresses. Specifically, they used bisulfite sequencing to examine methylation status on promoters in corn DNA.	Project was developed in collaboration with Dr. Thelma Madzima and Alaron Lewis at University of Washington - Bothell.	Quarter-long	Group	Instructor-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.
Biology	Majors	Students defined the elements of an effective gene promoter by designing novel promoters and cloning the construct into a reporter plasmid that produces red fluorescent protein if the promoter works.	Project was based on a CURE published in Course Source: Campbell, A.M. and Eckdahl, T.T. 2015. Using Synthetic Biology and pClone Red for Authentic Research on Promoter Function: Introductory Biology (identifying new promoters). CourseSource. https://doi.org/10.24918/cs.2015.2	Quarter-long	Group	Instructor-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.
Biology	Majors	Students conducted several projects throughout the quarter by utilizing public databases to collect data and evidence from statistical tests and to support or refute their (student-driven) hypotheses. In one project, students analyzed survey data from smokers and non-smokers to examine environmental and genetic factors that may contribute to persistent smoking. In the final project, students collected data from the CDC Environmental Public Health Tracker Database to see if there was a relationship between the two variables they chose. These topics could vary widely because the EPHT Database collects a lot of data on different things.		Quarter-long	Individual	Student-defined	Students used existing databases (https://ephtracking.cdc.gov) to analyze their research question.	Students prepared research posters and presented at a campus-wide research symposium.
Chemistry	Majors	Students explored the accuracy and precision of pH meters, dissolved oxygen sensors, and temperature probes. They measured these parameters for Mercer Slough water.		Quarter-long	Group	Student-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.
Chemistry	Majors	Students in CHEM&162 (General Chemistry II) chose variables and designed controls to test some aspect of biodiesel production. Each student group worked through 4 curriculum modules designed to guide them in project design, method development and data analysis.		Quarter-long	Group	Student-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.
Psychology	Introductory	Students defined their own research question based on course content. They gathered their own data from human participants using surveys or interviews.		Quarter-long	Group/Individual	Student-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.
Political Science	Introductory	Students define their own research question and pose a hypothesis which they test through their own data collection. Most students used online surveys and all students conducted their own analysis.		Quarter-long	Group	Student-defined	Students collected and analyzed their own data.	Students prepared research posters and presented at a campus-wide research symposium.