Supplemental Material

CBE—Life Sciences Education

Kabacoff *et al.*

A Summer Academic Research Experience for Disadvantaged Youth

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Summary of Supplemental Materials

Scientific Writing Syllabus

1. Essential: How to keep a scientific notebook, taking notes, writing a formal e-mail, general expectations
2. Scientific method
3. What is scientific writing?
4. Style of scientific writing
5. How to write a lab report
6. Prewriting: Paper/Poster
7. Composition of a scientific paper: IMRAD format
8. Ethics in scientific publishing: Citations and Plagiarism
9. Materials and methods
10. Results
11. Graphing with Excel
12. Figures and Tables: How to design effective tables and graphs
13. Discussion
14. Introduction: Funnel Method
15. Title and abstract
16. Summarizing a scientific article
17. References
18. Acknowledgements
19. Poster requirements
20. Setting up a poster
21. Work on poster
22. Practice presenting poster
23. Poster Presentation

Essay Writing Syllabus

The following essay topics were used for writing class. A general theme was required for each essay, but the topic remained the choice of the student.

1. Pre-assessment: Students were given the college application essays for their top college choice. They picked the topic that interested them the most.
2. Recalling an experience: Students wrote an essay about a personal experience.
3. Lab Report: Group Writing. The topic was "Measuring the Protein Concentration of a Cell Lysate."
4. Compare/Contrast. Students picked a topic that interested them and discussed similarities and differences
5. Cause/Effect: Students had a choice of whether to concentrate on causes or effects.
6. Introduction to the Poster: This is a first draft for their poster presentation. The purpose is to provide background for the scientific research they have been doing this summer.

7. Post-assessment: Reflection Essay- students reflected on their summer experience.

Exit Survey Questions for SARE

Please circle the number that indicates your current ***interest*** level in the areas below:

	low					high
Understanding the principles of biology	0	1	2	3	4	5
Being able to understand advances in science	0	1	2	3	4	5
Pursuing a career in science	0	1	2	3	4	5
Using the internet as a learning tool	0	1	2	3	4	5
Using a computer to analyze data and understand mathematical relationships	0	1	2	3	4	5
Understanding graphs	0	1	2	3	4	5

Please circle the number that represents your ***current confidence*** level in areas below:

	low					high
Understanding biological concepts	0	1	2	3	4	5
Reading a scientific article	0	1	2	3	4	5
Summarizing a scientific article	0	1	2	3	4	5
Reading an abstract for information about a paper	0	1	2	3	4	5
Skimming a scientific paper	0	1	2	3	4	5
Using PowerPoint	0	1	2	3	4	5
Writing an organized paragraph	0	1	2	3	4	5
Writing a 5 paragraph essay	0	1	2	3	4	5
Comfortable writing a paper a section at a time out of order, not necessarily from beginning to end	0	1	2	3	4	5
Recognizing plagiarism	0	1	2	3	4	5
Knowing how to cite references	0	1	2	3	4	5

Please circle the number that represents your ***degree of agreement*** with these statements:

	low					high
The ultimate purpose of doing science is publishing your new results.	0	1	2	3	4	5
The purpose of scientific writing is to communicate new scientific findings.	0	1	2	3	4	5
Scientific writing should be very complex so everyone appreciates how hard it is to do.	0	1	2	3	4	5
A key characteristic of scientific writing is clarity.	0	1	2	3	4	5
Writing can have many different purposes and audiences.	0	1	2	3	4	5
IMRAD is an acceptable format for a scientific paper.	0	1	2	3	4	5
The Introduction explains the problem being addressed.	0	1	2	3	4	5
The Methods section describes how you went about solving the problem.	0	1	2	3	4	5
The Results section tells what new knowledge you have to report.	0	1	2	3	4	5
The Discussion section explains what the findings mean.	0	1	2	3	4	5
A science paper is best read from beginning to end.	0	1	2	3	4	5
A scientist always writes a paper in order, starting with the introduction and ending with the discussion.	0	1	2	3	4	5
The sequence of lessons in Writing Class flowed logically, helping you to write the poster.	0	1	2	3	4	5
The expectations in Writing Class were clear to me.	0	1	2	3	4	5
The pace of the program was acceptable.	0	1	2	3	4	5
Regardless of my ultimate career path, the professional skills I worked on here will be useful	0	1	2	3	4	5
I recognize that professionalism encompasses reliability, responsibility, and respect.	0	1	2	3	4	5

Adapted from:

http://www.edcenter.sdsu.edu/projects/assessment/Potential_course_survey_questions.htm

Mathematics Pre-assessment Test

1. Calculate $(4-3)(1-(3+5))\times 5$
2. Calculate $\frac{3}{4}\times\frac{2}{15}+2\left(\frac{1}{3}-\frac{2}{5}\right)$
3. Simplify $7(1+9v)-8(5v-6)$
4. Solve for x: $-3(1+6x)=14-x$
5. Solve for x: $12(x-12)=9(1+7x)$
6. Factorize $12a^3-9a^2+4a-3$
7. Factorize $12xy-28x-15y+35$
8. Factorize $x^2-16x+63$
9. Factorize $7x^2-45x-28$
10. Simplify $-3\sqrt{12}+4\sqrt{3}-2\sqrt{6}$
11. Simplify $\sqrt{15\left(\sqrt{6}+\sqrt{5}\right)}$
12. Solve using the quadratic formula $2x^2-5x+3=0$
13. Plot the graph for $2x+y=5$
14. Plot the graph for $y\leq x^2$

Mathematics Final Assessment Test

Instructions:

- Please read the questions carefully and write down all the steps involved in solving the problem.
- Please use pencils to write your answers

1. Calculate $(5 - 3)(2 - (3 + 5)) \times 4$
2. Calculate $\frac{1}{4} \times \frac{6}{15} + 2\left(\frac{1}{3} - \frac{5}{6}\right)$
3. Simplify $7(1 + 5v) + 8(-3v + 4)$
4. Solve for x: $2(x - 12) = 9(1 + 5x)$
5. Factorize $12a^3 - 9a^2 + 4a - 3$
6. Factorize $12xy - 28x - 15y + 35$
7. Factorize $x^2 - 20x + 84$
8. Factorize $7x^2 - 45x - 28$
9. Factorize $2x^4 - 9x^2 + 9$
10. Simplify $4\sqrt{15}.\left(\sqrt{6} + \sqrt{5}\right)$
11. Solve using the quadratic formula $3x^2 - 5x + 2 = 0$
12. Given below are two datasets representing the marks obtained by students in two classes:

    Section A: 30, 25, 45, 30, 45, 35, 40, 38, 43, 47

    Section B: 25, 32, 27, 35, 37, 42, 28, 30, 38, 45

    Calculate the mean, median, range, variance and standard deviation for both the datasets.

    Which class has performed better?

    The students from which class have a tighter spread in marks?
13. Find the following trigonometric ratios:
    a. sin (180^0)
    b. sec (225^0)

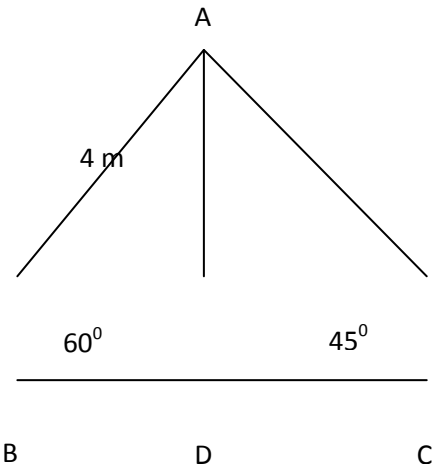
c. tan (-60^0)

d. cos (-120^0)

e. csc (150^0)

f. cot (270^0)

14. For the given triangle, find the following using trigonometric ratios



AD =

BD =

AC =

CD =

BC =

15. Identify the roots and plot the graph for $y = x(x + 1)(x + 2)$

16. Identify the roots and lot the graph for $y = x^2 - 3x + 2$

Writing Class Evaluation Survey

1. Strongly Disagree
2. Disagree
3. Undecided
4. Agree
5. Strongly Agree

Writing Course

The material covered was relevant to the needs of the scholars.	1	2	3	4	5

This class met my expectations.	1	2	3	4	5
This class furthered my knowledge of writing, including scientific writing.	1	2	3	4	5
This class made me feel more confident doing my poster.	1	2	3	4	5
This class will help me in my writing when I return to school.	1	2	3	4	5
I enjoyed taking this class.	1	2	3	4	5

Class Instructor

The instructor was helpful and friendly.	1	2	3	4	5
The instructor was able to teach me at my level.	1	2	3	4	5
The instructor showed enthusiasm in giving this class.	1	2	3	4	5
The instructor made each session enjoyable.	1	2	3	4	5
I would take another class given by this instructor	1	2	3	4	5

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The instructor made each session enjoyable.	1	2	3	4	5
I would take another class given by this instructor	1	2	3	4	5

Adapted from http://surveymonkey.com

Please answer the questions below.

1. What did you like the most about SARE?
2. What could improve the program?

Introduction to Chemistry and Biology Syllabus (ten one-hour sessions)

1. Basic Lab Chemistry: Concentrations, dilutions, metric units, pipetting
2. Acid-Base Titrations
3. Cells: Prokaryotes and eukaryotes, phylogeny, cell organization and structure
4. Biomolecules
5. Central Dogma: DNA, RNA, and protein
6. Genetics
7. Cloning Techniques: Plasmids and transformations
8. Cloning Techniques: Restriction enzymes, ligation, polymerase chain reaction
9. Electrophoresis: Protein and DNA, practice gel-loading
10. Basics of Microscopy

Guide to Professionalism

	Needs Professionalism	Professional in training
Character Character is who you are and what you stand for.	• Settle for mediocrity • Expect it to be easy • Make or seek excuses • Arrive late or not at all • Deliver work late • Go back on your word • Hide from your mistakes • Be a slacker	• Hold yourself to the highest standards • Make a commitment to grow continually • Raise the bar on what you expect of yourself • Take pride in yourself and your work
Attitude They put passion into their work and begin everything with an aura of confidence and quality.	• Wait for someone to push you or prod you along • Dwell on setbacks or obstacles • Assume that someone else will take care of you • Always complain or become discouraged • Be a Quitter	• Rise above the crowd • Be a self starter • Maintain a positive attitude • Express your energy and enthusiasm • Spring back from setbacks • Be courteous, friendly and considerate • Be eager to learn
Excellence Strive to be the best that they can be.	• Tolerate mediocrity from yourself and others • Turn in work that is incomplete or inferior • Fail to do homework • Does not attempt to put forth an effort	• Raise the bar • Check your work and complete it in all respects • Pay attention to detail • Redo work that does not meet your standards
Competency They understand the requirements and responsibilities of their job.	• Take a half-hearted or apathetic approach • Be afraid to make mistakes or ask questions • Forget to practice • Accept less than your personal best • Waste your time and that of your colleagues	• Learn and understand the requirements of your job • Make sure you understand what is expected of you • Press yourself to improve your performance and your results
Conduct Professionals are mature. They develop social skills and an appreciation for others.	• Lose your temper or act in a violent manner • Get defensive or argumentative • Roll your eyes, glare, smirk • Keep others waiting • Say or do anything rude, hurtful or mean • Undermine authority of others • Use cell phone inappropriately	• Act in a professional manner at all times • Establish eye contact • Arrive on time • Take steps to manage your time well • Develop good work habits • Gives tremendous respect to colleagues

Adapted from: *www.rcampus.com/**rubrics**howc.cfm*