

## 2017 Annual Assessment Report- Biochemistry and Molecular Biology

### I. Annual Assessment Meetings

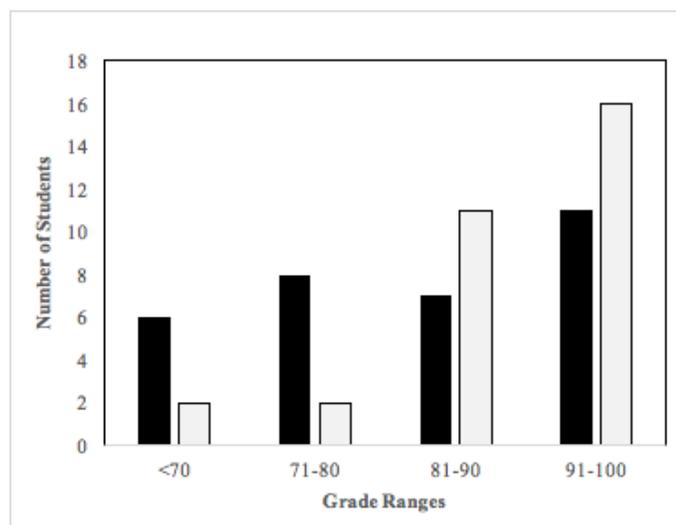
The BCS Faculty (Professors Bailey, Blake, Burwell, Schmidt & Schnurr) met several times this academic year to discuss Assessment. At the December 6, 2016, meeting (1:30-2:30) we made sure that each of the respective major programs (Biology, Chemistry, Biochemistry & Molecular Biology, and Biological & Chemical Sciences) would have their own assessment and point person. At the May 2, 2017, meeting (12:20-1:00) the BCS faculty updated each other on the respective assessments and talked about common themes and formats. On May 4, 2017 Professors Bailey and Burwell met to further discuss details of the Chemistry assessment plan and report. On May 11, 2017, the BCS faculty met from 11:00AM-12:10PM to review and comment on all the assessment plans and reports.

### II. Closing the loop

This year the biochemistry and molecular biology assessment plan was reformatted to meet the 2016 updates standards since it was not formatted and submitted last year.

### III. Examination of data collected for this year's targeted learning outcomes

This year's targeted learning outcome will be goal 1, objective A, outcome 2 (organize and utilize a lab notebook to record findings, analyze data, and become an independent researcher). The data in Figure 1 illustrates the distribution of grades for the open notebook lab final for CHEM 213 Organic Chemistry I (Fall 2016) and CHEM 214 Organic Chemistry II (Spring 2017). Since Organic Chemistry II is a continuation of Organic Chemistry I, the same students make up both populations. In the Fall semester 80% of the class scored above a C on the exam. In the Spring semester 94% scored above a C. Therefore, based on the success criteria, it was concluded that the skill of keeping a lab notebook was met and had improved throughout the year.



**Figure 1. End of the Semester Grade Distribution for the Organic Chemistry Open Notebook Lab Exam.** Grade Distributions are reported for 2016 Fall semester Organic Chemistry I (black) and 2017 Spring semester Organic Chemistry II (grey). Exam questions used for this assessment are included in appendix I at the end of this document.

Although, the success criteria had been met, there were a few reasons to improve the assessment of this outcome. First, throughout each semester students continued to ask how to do a procedure or a calculation that were covered in previous labs. They should have been able to find these details outlined in their lab notebooks. It was also noted that many students recorded their data analysis in their post-lab assignments but forgot to record these findings in their notebooks. Therefore, changing the assessment approach and the frequency the notebook assessment will encourage students to develop stronger lab notebook skills.

### IV. Program Changes for the Upcoming Year.

To improve the lab notebook learning outcome a checklist

will be constructed and given to students at the beginning of the semester in both Organic Chemistry and Biochemistry to ensure they do not forget to write down essential details and protocols. This checklist will also be utilized as another measurable outcome to quickly assess and provide feedback on lab notebooks throughout the entire semester. Next year, assessment of a student's ability to organize and utilize a lab notebook will include both the open notebook lab exam performance and performance on random notebook checks. This assessment will be analyzed using a new population of students entering Organic Chemistry (CHEM 213L and CHEM 214L) and students enrolled in Biochemistry (CHEM 323L) which were the students analyzed in Figure 1.

**V. Action Plan for the Upcoming Year** This year's targeted learning outcome will be Goal 1, Objective B, Outcome 2 (Organize and utilize a lab notebook to record findings, analyze data, and become an independent researcher). This outcome is highlighted below. Lindsay Burwell will oversee designing the new measurable outcome (checklist), collecting, and analyzing data from both the lab **notebook exam and random lab notebook checks** after both semesters.

<b>Goal 1:</b> Provide students with background knowledge and technical skills needed for the biochemical sciences.					
<i>Objective</i>	<i>Outcome</i>	<i>Measure</i>	<i>Measurement Tool</i>	<i>Success Criteria</i>	<i>Data Location</i>
B. Students will have a foundation in the technological skills used in biochemistry and molecular biology.	2.Organize and maintain a lab notebook to record findings, analyze data, and become an independent researcher	Open Lab Notebook Exams (CHEM 213L, CHEM 214L, CHEM 323L)  Lab Notebook Checklist (CHEM 213L, CHEM 214L, CHEM 323L)	Answer Keys to open lab notebook exams  Checklist	overall student proficiency will be considered met if 70% of the students demonstrate a passing grade on the assessed activity	Faculty Files

#### **V. The Updated Assessment Plan**

The assessment plan was updated this year to match the format outlined in 2016.

## Appendix I

### Open Notebook Lab Exams for Organic Chemistry (CHEM 213L and CHEM 214L)

#### I. Fall Semester Organic Chemistry 213L

Draw the structure and identify the molecular weights for the following compounds:

Compound	Molecular Weight	Structure
Acetylsalicylic acid		
Caffeine		
Isopentyl acetate		

Short answer

1. During the caffeine lab, we changed the protocol to isolate the caffeine crystals. What did we do instead of vacuum sublimation?
2. During the beta carotene lab we used what technique to quantify the amount of beta carotene coming off of the column? BRIEFLY explain the procedure used to quantify the amount of beta carotene in your same. You do not need to include calculations.
3. What piece of equipment was used to calculate the percent alcohol isolated by simple distillation? What physical property is being used to measure alcohol concentration in this procedure? Why are essential oils isolated by steam and not simple distillation?
4. What was the mass and percent yield of the isopentyl acetate you synthesized? Why did you use the gas chromatograph?
5. During the saponification lab you calculated the amount of NaOH to use and when you did this you used 96% of the olive oil, coconut oil and Crisco mass. Why?

#### II. Spring Semester Organic Chemistry 214L

1. Please fill out the following chart with the physical properties of compounds we used throughout the semester.

Compound	Melting point	Molecular Weight	Structure
1-bromoadamantane			
2-bromo-2-methylpropane			
dulcin			
aniline			

2. What was the purpose of lab 2 using 1-bromoadamantane? In lab 2 why did you use bromophenol blue in testing the reactivity of 1-bromoadamantane? What is solvolysis? Why did you compare it to 2-bromo-2-methylpropane?
3. Draw a picture of a reflux apparatus. Be sure to include all tubing, glassware and equipment that was needed in your setup. Which labs this semester did we need to set up a reflux apparatus. (you may draw it on a separate sheet of paper if necessary). What is the purpose of refluxing a reaction?
4. Draw the structure of the dye that you synthesized. Summarize your results in a short paragraph. In your answer included what was d1, c1, d2 and c2 used for. Which fabrics did you test and which dyed more efficiently? Explain why you think that might have occurred based on the chemistry of the dye and the fiber.