

Course Student Learning Outcomes Assessment

CHEM 249 Organic Chemistry I

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General Information (Course Student Learning Outcomes Assessment)

Standing Requirements

Course Description

This course is the first semester of a year of organic chemistry. This course will cover: structure and bonding nomenclature descriptive chemistry reaction mechanisms synthetic methods and IR spectroscopy for different functional groups including alkanes alkenes alkynes alkyl halides organometallics alcohols and ethers. Laboratory will include: separations/purifications identification and simple syntheses.

Course Student Learning Outcomes

CHEM 249 Organic Chemistry I Outcome Set

Outcome	
Outcome	Mapping
Outcome 1 Apply major concepts of chemical reactivity of organic compounds to solve problems.	Institutional Student Learning Outcomes: Act 1, Communicate 1, Communicate 2, Learn 1, Learn 2, Think 1, Think 2
Outcome 2 Write in scientific terms and interpret patterns of reactivity on the basis of mechanistic reasoning.	Institutional Student Learning Outcomes: Act 2, Communicate 1, Communicate 2, Learn 1, Think 1, Think 2
Outcome 3 Follow published reaction protocols to synthesize, isolate, purify and characterize compounds using standard laboratory equipment and modern instrumentation then interpret laboratory results.	Institutional Student Learning Outcomes: Act 1, Communicate 1, Communicate 2, Learn 1, Think 1, Think 2

2014-2015 Assessment Cycle

Measurements

Outcomes and Measures

CHEM 249 Organic Chemistry I Outcome Set

Outcome

Outcome 1

Apply major concepts of chemical reactivity of organic compounds to solve problems.

▼ **Measure:** Chem 249 lecture - MC exam
Course level; Direct - Exam

Description of Measurement Tool: A multiple choice final exam is given to test the students' basic understanding of concepts covered in Organic Chemistry.

Criteria for Success: Individual & Collective Student Criterion: A successful student must score 60% or higher correct on the common multiple choice questions. The SLO is achieved when a minimum of 70% of the students taking the course are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department.

Outcome 2

Write in scientific terms and interpret patterns of reactivity on the basis of mechanistic reasoning.

▼ **Measure:** Chem 249 lecture - mechanism
Course level; Direct - Exam

Description of Measurement Tool: A rubric will be used to assess the student's ability to use mechanistic reasoning in order to write a complete mechanism for a reaction they are not familiar with.

The mechanism for this assessment was for the hydrobromination of 3,3-dimethyl cyclopentene to form 1-bromo-1,2-dimethylcyclopentane.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their mechanism is deemed at the "competent" level. The mechanism is graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 3 criteria, a student will be considered "competent", and achieving the SLO, if they score a 6 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department.

Supporting Attachments:

 Chem 249 mechanism rubric (Microsoft Word) (See appendix)

Outcome 3

Follow published reaction protocols to synthesize,

▼ **Measure:** Chem 249 lab
Course level; Direct - Other

isolate, purify and characterize compounds using standard laboratory equipment and modern instrumentation then interpret laboratory results.

Description of Measurement Tool: A rubric is used to grade the students' laboratory reports.

This particular laboratory report was for a synthesis protocol making acetaminophen. The students had to provide a full typed "formal" laboratory report.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their report is deemed at the "competent" level. The report sections are graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 8 criteria, a student will be considered "competent", and achieving the SLO, if they score a 16 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome and deemed at the "competent" level.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department.

Supporting Attachments:

 Chem 249 lab report rubric (Microsoft Word) (See appendix)

Findings

Finding per Measure

CHEM 249 Organic Chemistry I Outcome Set

Outcome

Outcome 1

Apply major concepts of chemical reactivity of organic compounds to solve problems.

▼ **Measure:** Chem 249 lecture - MC exam
Course level; Direct - Exam

Description of Measurement Tool: A multiple choice final exam is given to test the students' basic understanding of concepts covered in Organic Chemistry.

Criteria for Success: Individual & Collective Student Criterion: A successful student must score 60% or higher correct on the common multiple choice questions. The SLO is achieved when a minimum of 70% of the students taking the course are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department.

Findings for Chem 249 lecture - MC exam

Summary of Findings: Two sections of chem. 249 were assessed with 39 students. Forty multiple choice question exam was given with an average of 29 correct answers (72.5%). Out of 39 students, 32 (82 % of the students) obtained 60 % or higher on the MCQ exam.

Results: Criteria for Success Achievement Status: Met

Analysis of Findings: The average score on the MCQ is comparable to last assessment. Out of 39 students, 32 (82 % of the students) obtained 60 % or higher on the MCQ exam.

The SLO for this course was achieved.
The students had trouble with the following concept questions:
Question # 1 (Constitutional isomers)
Question # 15 (Carbocation rearrangement)
Question # 16 (Stereochemistry of dehydrohalogenation)

Question #19 (tosylate resonance)
 Question #22 (degrees of unsaturation and structure)
 Question #25 (hydroboration oxidation of an alkene)
 Question # 35 (E vs SN2)


Recommendations: Based on commonly missed questions in the previous year, we modified the wording on some of the commonly missed questions as well as introduced stereoisomerism earlier in the semester. We have shown improvement in the area of stereoisomers and regiochemistry compared to the year prior ; however, 5 of the 7 questions with high percentage of wrong answers (#s 1, 15, 16, 19, and 35) are still the same from the year before.

They are tough concepts, but we will look into how we cover those topics in lecture and see if any further revisions are needed for clarification in the MCQs.

We already changed # 19 and added structure of tosylate, yet the students still have difficulty with its resonance. The concept of resonance will still be covered, but may be not using the specific case of tosylate for question 19.

Question # 22 with degrees of unsaturation is covered more extensively in Chem 259, so that question will be replaced.

Substantiating Evidence:

 Chem 249_SLO A_Data_F2014.xlsx (Excel Workbook (Open XML)) (See appendix)

Outcome 2

Write in scientific terms and interpret patterns of reactivity on the basis of mechanistic reasoning.

▼ Measure: Chem 249 lecture - mechanism Course level; Direct - Exam

Description of Measurement Tool: A rubric will be used to assess the student's ability to use mechanistic reasoning in order to write a complete mechanism for a reaction they are not familiar with.

The mechanism for this assessment was for the hydrobromination of 3,3-dimethyl cyclopentene to form 1-bromo-1,2-dimethylcyclopentane.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their mechanism is deemed at the "competent" level. The mechanism is graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 3 criteria, a student will be considered "competent", and achieving the SLO, if they score a 6 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department.

Supporting Attachments:

 Chem 249 mechanism rubric (Microsoft Word) (See appendix)

Findings for Chem 249 lecture - mechanism

Summary of Findings: Two sections were assessed with 39 students.

Results: Criteria for Success Achievement Status: Met


Analysis of Findings: 34/39 students (87%) are competent or above (scored 6 or above on the rubric) at writing reaction mechanisms. Only 5 students were below the competent level. This is an improvement from last year's data where 59% were competent.

The data sample was much larger (39 students vs 17 students) than the previous assessment. That also helps with statistical error due to small size sample.

Recommendations: We can say that 87% of our Chem 249 students achieved SLO B. This can

be attributed to the increased practice in the form of worksheets given to the students as well as a change in textbooks. The current textbook (Klein's Organic Chemistry 1st edition) introduces mechanisms much earlier in the text (Ch. 2) than the previously used textbook. It makes students start using mechanisms and curved arrow notation by the second week of class and continues throughout the entire course. Practice and understanding reactions through mechanisms is helping the students master this skill and SLO.

Substantiating Evidence:

 Chem 249_SLO B_Data_F2014.xlsx (Excel Workbook (Open XML)) (See appendix)

Outcome 3

Follow published reaction protocols to synthesize, isolate, purify and characterize compounds using standard laboratory equipment and modern instrumentation then interpret laboratory results.

▼ **Measure:** Chem 249 lab
Course level; Direct - Other

Description of Measurement Tool: A rubric is used to grade the students' laboratory reports.

This particular laboratory report was for a synthesis protocol making acetaminophen. The students had to provide a full typed "formal" laboratory report.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their report is deemed at the "competent" level. The report sections are graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 8 criteria, a student will be considered "competent", and achieving the SLO, if they score a 16 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome and deemed at the "competent" level.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department.

Supporting Attachments:

 Chem 249 lab report rubric (Microsoft Word) (See appendix)

Findings for Chem 249 lab

Summary of Findings: Two sections were assessed with 38 students.

Note: "competent" in each section is equivalent to a score of "2". Competent on all 7 sections would equal an overall score of 14.

Results: Criteria for Success Achievement Status: Met

Analysis of Findings: As shown in the data below in all parts of the lab reports, 70 % or more are competent to accomplished.

There are a couple of areas that can use some improvements. These include writing reaction mechanism (24% of the students are developing) and data table with calculating a theoretical yield (18% of the students are developing).



Out of 38 students, only one student (3%) did not achieve an average of competent on the lab report (less than 16/24).

The students scored low in making their physical data table and calculating a theoretical yield (only 82% are competent or above) and they are weak in including a reaction mechanism (only 76% were competent or above).

Recommendations:

This is still consistent with the weak areas from last assessment but it should be noted that students results had considerably improved from the last assessment. It is thought that changing the report assessment to middle of the semester was better than including it on the last report of the semester. By the end students are exhausted and have so many exams and lab reports are the considered as first priority.

Substantiating Evidence:

  Chem 249_SLO C_Data_F2014.xlsx (Excel Workbook (Open XML)) (See appendix)

Overall Recommendations

No text specified

Plans of Action

Actions

Status Reports

Action Statuses

Status Summary

No text specified

Summary of Next Steps

No text specified

2013-2014 Assessment Cycle

Measurements

Outcomes and Measures

CHEM 249 Organic Chemistry I Outcome Set

Outcome

Outcome 1

Apply major concepts of chemical reactivity of organic compounds to solve problems.

▼ **Measure:** Chem 249 lecture - MC exam
Course level; Direct - Exam

Description of Measurement Tool: A multiple choice final exam is given to test the students' basic understanding of concepts covered in Organic Chemistry.

Criteria for Success: Individual & Collective Student Criterion: A successful student must score 60% or higher correct on the common multiple choice questions. The SLO is achieved when a minimum of 70% of the students taking the course are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department. The "lead instructor" for Chem 249 in Fall 2013 was Denise Bailey.

Outcome 2

Write in scientific terms and interpret patterns of reactivity on the basis of mechanistic reasoning.

▼ **Measure:** Chem 249 lecture - mechanism
Course level; Direct - Exam

Description of Measurement Tool: A rubric will be used to assess the student's ability to use mechanistic reasoning in order to write a complete mechanism for a reaction they are not familiar with.

The mechanism for this assessment was for the hydrobromination of 3,3-dimethyl cyclopentene to form 1-bromo-1,2-dimethylcyclopentane.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their mechanism is deemed at the "competent" level. The mechanism is graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 3 criteria, a student will be considered "competent", and achieving the SLO, if they score a 6 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department. The "lead instructor" for Chem 249 in Fall 2013 was Denise Bailey.

Supporting Attachments:

 Chem 249 mechanism rubric (Microsoft Word) (See appendix)

Outcome 3

Follow published reaction protocols to synthesize, isolate, purify and characterize compounds using standard laboratory equipment and modern instrumentation then interpret laboratory results.

▼ **Measure:** Chem 249 lab
Course level; Direct - Other

Description of Measurement Tool: A rubric is used to grade the students' laboratory reports.

This particular laboratory report was for a synthesis protocol using a Grignard reagent. The students had to provide a full typed "formal" laboratory report and include IR analysis of their product.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their report is deemed at the "competent" level. The report sections are graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 7 criteria, a student will be considered "competent", and achieving the SLO, if they score a 14 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome and deemed at the "competent" level.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department. The "lead instructor" for Chem 249 in Fall 2013 was Denise Bailey.

Supporting Attachments:

 Chem 249 lab report rubric (Microsoft Word) (See appendix)

 Findings

Finding per Measure

CHEM 249 Organic Chemistry I Outcome Set

Outcome

Outcome 1

Apply major concepts of chemical reactivity of organic compounds to solve problems.

▼ **Measure:** Chem 249 lecture - MC exam
Course level; Direct - Exam

Description of Measurement Tool: A multiple choice final exam is given to test the students' basic understanding of concepts covered in Organic Chemistry.

Criteria for Success: Individual & Collective Student Criterion: A successful student must score 60% or higher correct on the common multiple choice questions. The SLO is achieved when a minimum of 70% of the students taking the course are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department. The "lead instructor" for Chem 249 in Fall 2013 was Denise Bailey.

Findings for Chem 249 lecture - MC exam

Summary of Findings: One section of Chem. 249 was assessed with 17 students. A forty multiple choice question exam was given with an average of 27.5 correct answers (68.8%). 13 out of 17 students (76%) scored above 60% on the MCQ part of the final exam. Thus, SLO A was achieved.

Note: The same MC was given when this SLO was assessed in Spring 2013.

Results: Criteria for Success Achievement Status: Met

Analysis of Findings: The students had trouble with the following concept questions:


Question # 1 (Constitutional isomers)*
 Question # 15 (Carbocation rearrangement)*
 Question # 16 (Stereochemistry of dehydrohalogenation)*
 Question # 17 (Stereochemistry of dehydrohalogenation)
 Question # 18 (regiochemistry of dehydrohalogenation)
 Question # 19 (tosylate resonance)*
 Question # 35 (E vs SN2)*
 Question # 37 (alkene to alkyne reagents)
 Question # 40 (base strength)

*Questions were among the 7 most missed questions during Spring 2013 as well.

We have shown improvement in the area of degrees of unsaturation and cyclohexane chair conformations (Q. 8 & 22) compared to the semester prior. However, 5 of the 9 questions with high percentage of wrong answers (#s 1, 15, 16, 19 & 35) are still the same from the semester before.

Recommendations: Question #s 1, 15, 16, & 35 have been highly missed since we implemented this assessment in 2011; they are tough concepts, but ones that we spend a large amount of time on in lecture. We will look into the clarity of the wording of those MCQs to see if further revisions are needed.

Substantiating Evidence:

 Chem 249 MC exam analysis (Excel Workbook (Open XML)) (See appendix)

Outcome 2

Write in scientific terms and interpret patterns of reactivity on the basis of mechanistic reasoning.

▼ Measure: Chem 249 lecture - mechanism

Course level; Direct - Exam

Description of Measurement Tool: A rubric will be used to assess the student's ability to use mechanistic reasoning in order to write a complete mechanism for a reaction they are not familiar with.

The mechanism for this assessment was for the hydrobromination of 3,3-dimethyl cyclopentene to form 1-bromo-1,2-dimethylcyclopentane.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their mechanism is deemed at the "competent" level. The mechanism is graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 3 criteria, a student will be considered "competent", and achieving the SLO, if they score a 6 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department. The "lead instructor" for Chem 249 in Fall 2013 was Denise Bailey.

Supporting Attachments:

 Chem 249 mechanism rubric (Microsoft Word) (See appendix)

Findings for Chem 249 lecture - mechanism

Summary of Findings: 10 out of 17 students (59%) are competent or above at writing reaction mechanisms overall; 7 students (41%) were below. The SLO was not met.

Results: Criteria for Success Achievement Status: Not Met

Analysis of Findings: Overall score on the mechanism/assessment (out of 9 possible):

0: 2 students (12%)


1: --
 2: --
 3: 3 students (18%)
 4: 1 student (6%)
 5: 1 student (6%)
 -----Competent-----
 6: --
 7: 1 student (6%)
 8: 2 students (12%)
 9: 7 students (41%)

This is a definite decrease in our passing of the SLO compared to the prior semester. These numbers were hurt drastically since 2 students (12%) did not even attempt the problem. If these are not considered in the analysis then 10 students out of only 15 (67%) passed the SLO. Having such statistically low numbers (only 17 data points), it may be best to combine this data over a year and/or only analyze the data when we have 2 or more sections of the class.

From detailed analysis of each criterion: 11 students were competent on electron flow, 10 students were competent on charges of intermediates, and 12 students were competent on drawing the product of each mechanistic step. There is no one area which is weaker than the others. Students generally comprehend the writing of mechanisms or they do not.

Recommendations: We will continue to use this assessment and, as always, stress mechanism writing during the course. We may need to combine this data with additional semesters' in order to make the numbers statistically relevant.

Substantiating Evidence:

 Chem 249 mechanism detailed analysis (File) (See appendix)

This Findings is associated with the following Actions:

Chem 249 lecture - mechanism

(Plans of Action; 2013-2014 Assessment Cycle)

Outcome 3

Follow published reaction protocols to synthesize, isolate, purify and characterize compounds using standard laboratory equipment and modern instrumentation then interpret laboratory results.

▼ **Measure:** Chem 249 lab
 Course level; Direct - Other

Description of Measurement Tool: A rubric is used to grade the students' laboratory reports.

This particular laboratory report was for a synthesis protocol using a Grignard reagent. The students had to provide a full typed "formal" laboratory report and include IR analysis of their product.


Criteria for Success: Individual & Collective Student Criterion: A student achieves this SLO when their report is deemed at the "competent" level. The report sections are graded on a 0-3 scale, where 0 is "beginning", 1 is "developing", 2 is "competent", and 3 "accomplished" level. Three different criteria of a reaction mechanism are assessed on this scale (see attached rubric for definition of what constitutes each level for each of the 3 criteria assessed). As "competent" is a score of 2 on each of the 7 criteria, a student will be considered "competent", and achieving the SLO, if they score a 14 overall.

We will consider the SLO met when 70% of the students assessed are successful in achieving the outcome and deemed at the "competent" level.

Cycle of Assessment: This SLO is assessed during each Fall semester.

Who is Responsible for Assessment Activity?: The instructor of record is responsible for administering the assessment. The "lead instructor" for the course is responsible for compiling the data and sharing results with the department. The "lead instructor" for Chem 249 in Fall 2013 was Denise Bailey.

Supporting Attachments:

 Chem 249 lab report rubric (Microsoft Word) (See appendix)

Findings for Chem 249 lab

Summary of Findings: 12 out of 17 (71%) of the students are competent or above in writing

laboratory reports overall.

We have met the SLO.

Results: Criteria for Success Achievement Status: Met

Analysis of Findings: Overall score on the lab report/assessment (out of 21 possible):

0: --
 1: --
 2: --
 3: --
 4: --
 5: --
 6: --
 7: 1 student (6%)
 8: --
 9: 1 student (6%)
 10: --
 11: 1 student (6%)
 12: --
 13: 2 students (12%)
 -----Competent-----
 14: 1 student (6%)
 15: 2 students (12%)
 16: 3 students (18%)
 17: 1 student (6%)
 18: 3 students (18%)
 19: 2 students (12%)
 20: --
 21: --

Overall, the students are doing well at writing lab reports. This comes from the repeated practice while writing at least one lab report per week throughout the semester of Chem 249.

This data shows an improvement in the "reaction & mechanism" and "physical data table" sections compared to the prior semester. This improvement is most likely due to the increased time spent in lab covering how to correctly fill out a data table as well as writing mechanisms for the experiments.

The students struggled the most with "Analysis" of their reaction/experiment (only 47% were competent or above). Most students included some analysis, but did not discuss all necessary components (yield, purity, and functional groups present (IR analysis)).

When the scores for reaction and mechanism were low (35% of students scored below the competent level), it was due to an overall reaction being written but lacking an arrow pushing mechanism. Likewise, reports with low scores for the physical data table section (41% of the students were below competent) were typically missing the theoretical yield for the product included in the table.

It should be noted that this was the last lab report of the semester and due 2 days sooner than the rest of the lab report throughout the semester; fatigue may have played a role.

Recommendations: We will continue using this style of analysis, but may consider analyzing the report of an experiment done in the middle of the semester, rather than the very last one of the semester.

In order to improve student achievement in the lacking areas, we will provide a handout detailing what should be included in every lab report. Students should be able to follow this "checklist" to be sure they are not omitting any sections.

Overall Recommendations

No text specified

Plans of Action

Actions

CHEM 249 Organic Chemistry I Outcome Set

Outcome

Outcome 2

Write in scientific terms and interpret patterns of reactivity on the basis of mechanistic reasoning.

▼ **Action:** Chem 249 lecture - mechanism

This Action is associated with the following Findings

Findings for Chem 249 lecture - mechanism

(Measurements and Findings; 2013-2014 Assessment Cycle)

Summary of Findings: 10 out of 17 students (59%) are competent or above at writing reaction mechanisms overall; 7 students (41%) were below. The SLO was not met.

Details of Plan of Action: We will purchase white boards for students to practice mechanism writing during lecture and lab.

Plan of Action Timeline: Before the next assessment cycle in Fall 2014.

Who is responsible for carrying out the Plan of Action?: The department chair, Denise Bailey, in coordination with the lab coordinator, Ashley Jensen.

How will you determine if the Plan of Action has been effective?: We will reassess in Fall 2014 and compare to the previous results to look for improvements.

Additional Resources Required (if any): Class set of white boards, dry erase markers, and erasers.

Budget request amount: \$200.00

Priority: Medium

 Status Reports

Action Statuses

CHEM 249 Organic Chemistry I Outcome Set

Outcome

Outcome 2

Write in scientific terms and interpret patterns of reactivity on the basis of mechanistic reasoning.

▼ **Action:** Chem 249 lecture - mechanism

Details of Plan of Action: We will purchase white boards for students to practice mechanism writing during lecture and lab.

Plan of Action Timeline: Before the next assessment cycle in Fall 2014.

Who is responsible for carrying out the Plan of Action?: The department chair, Denise Bailey, in coordination with the lab coordinator, Ashley Jensen.

How will you determine if the Plan of Action has been effective?: We will reassess in Fall 2014 and compare to the previous results to look for improvements.

Additional Resources Required (if any): Class set of white boards, dry erase markers, and erasers.

Budget request amount: \$200.00

Priority: Medium

Status for Chem 249 lecture - mechanism

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2012-2013 Assessment Cycle

 **Measurements**

 **Findings**

 **Plans of Action**

 **Status Reports**

Appendix

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- A. **Chem 249 lab report rubric** (Microsoft Word)
 - B. **Chem 249 mechanism rubric** (Microsoft Word)
 - C. **Chem 249_SLO A_Data_F2014.xlsx** (Excel Workbook (Open XML))
 - D. **Chem 249_SLO B_Data_F2014.xlsx** (Excel Workbook (Open XML))
 - E. **Chem 249_SLO C_Data_F2014.xlsx** (Excel Workbook (Open XML))
 - F. **Chem 249 lab report rubric** (Microsoft Word)
 - G. **Chem 249 mechanism rubric** (Microsoft Word)
 - H. **Chem 249 MC exam analysis** (Excel Workbook (Open XML))
 - I. **Chem 249 mechanism detailed analysis** (Unknown File)
-