Chem 112 A and B  
Course Assessment in a Box

1. Number and the name of the course being assessed.  
Chem 112 (A and B)

2. Course SLO’s

Chem 112-A  
(a) To provide a thorough understanding of complex organic molecules in terms of their structure, reactivity and real-life applications.  
(b) By a combination of labs and lecture, to get hands-on experience in organic chemistry and its applications in the chemical and pharmaceutical industry.  
(c) A thorough understanding of all functional groups, their reactions, mechanisms.  
   Functional groups to include hydrocarbons, alcohols, SN1 and SN2 reactions, ethers, sulfides, organometallic reagents.  
(d) Proficiency in nomenclature, spectroscopy, synthesis, reactions and mechanisms of the above functional groups.  
(e) Ability to perform techniques in modern organic chemistry.

Chem 112-B  
(a) To provide a thorough understanding of complex organic molecules in terms of their structure, reactivity and real-life applications.  
(b) By a combination of labs and lecture, to get hands-on experience in organic chemistry and its applications in the chemical and pharmaceutical industry.  
(c) Ability to perform techniques in modern organic chemistry.  
(d) A thorough understanding of all functional groups, their reactions, mechanisms.  
   Functional groups to include aldehydes and ketones, carboxylic acids and their derivatives, benzene, conjugated systems, amines.  
(e) Proficiency in nomenclature, spectroscopy, synthesis, reactions and mechanisms of the above functional groups.

3. If you have any dialogue about Course SLO’s among faculty who teach this course please describe it here.

Dr. Ganguly is the only faculty at Ohlone College that teaches the course. However, to maintain smooth articulations with all CSU’s and UC’s, I have had several in-person meetings with faculty of San Jose State University, CSU East Bay, UC Berkeley counsellors and phone conversations with counselors at UC Davis and San Diego. This in-person communication is maintained at a yearly level still with some universities such as CSU East Bay.
4. **List the SLO’s you are assessing.**

1. SLO (d) in Chem 112-A
2. SLO (d) in Chem 112-B
In addition: Assessment of the questions styled after the National ACS (American Chemical Society) exam in both the courses.

5. **Describe the assessment strategy or tool that addresses the SLO’s**

1. Assessment of knowledge of Synthesis and Mechanisms from student performance in dedicated questions in the course’s 3rd Hour exam.
2. Assessment of knowledge of Nomenclature, Spectroscopy and Reactions from student performance in dedicated questions in the course’s Final exam.
3. Assessment of the National ACS (American Chemical Society) style questions in the multiple choice sections of the final exam of both courses.

6. **Describe how the criteria or standards in this assessment tool link to the SLO’s being assessed.**

The SLO’s being assessed pertain to competencies taught in Chem 112.

1. The 3rd exam is comprehensive in both courses in terms of reactions taught in the entire course and thus the questions on Synthesis and Mechanisms in this exam reflect the students ability to apply knowledge of broad reactions to complex synthesis and mechanisms.
2. The Final exam is comprehensive in Nomenclature, Reactions and Spectroscopy for the entire course and thus dedicated questions on this topic reflect the student’s ability to retain and apply this information.
3. Performance in the ACS style exam (which is 1/4th of the total points of the Final Exam) is an indication of how they might perform in this National Exam.

7. **By looking holistically at the results from all students, describe your findings.**

    *A) Collection of data:*

    **Batch of 2010-2011**

<table>
<thead>
<tr>
<th>Course</th>
<th>Exam</th>
<th>Time of assessment</th>
<th># Students assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>112-A</td>
<td>3rd Exam</td>
<td>Dec 2010, Fall 2010</td>
<td>44</td>
</tr>
<tr>
<td>112-A</td>
<td>Final Exam</td>
<td>Dec 2010, Fall 2010</td>
<td>41</td>
</tr>
<tr>
<td>112-A</td>
<td>ACS style on Final</td>
<td>Dec 2010, Fall 2010</td>
<td>41</td>
</tr>
<tr>
<td>112-B</td>
<td>3rd Exam</td>
<td>May 2011, Spr 2010</td>
<td>24</td>
</tr>
<tr>
<td>112-B</td>
<td>Final Exam</td>
<td>May 2011, Spr 2010</td>
<td>23</td>
</tr>
<tr>
<td>112-B</td>
<td>ACS style on Final</td>
<td>May 2011, Spr 2010</td>
<td>23</td>
</tr>
</tbody>
</table>
Batch of 2011-2012

<table>
<thead>
<tr>
<th>Course</th>
<th>Exam</th>
<th>Time of assessment</th>
<th># Students assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>112-A</td>
<td>3rd Exam</td>
<td>Dec 2011, Fall 2010</td>
<td>42</td>
</tr>
<tr>
<td>112-A</td>
<td>Final Exam</td>
<td>Dec 2011, Fall 2010</td>
<td>38</td>
</tr>
<tr>
<td>112-A</td>
<td>ACS style on Final</td>
<td>Dec 2011, Fall 2010</td>
<td>38</td>
</tr>
</tbody>
</table>

For 112-B the 3rd and Final Exam are yet to be evaluated in May of 2012. This is an ongoing process for all classes of Organic Chemistry.

B) Performance of Students:

Note: Student success measured on getting 75% of the answer correct. i.e. the 73% in the synthesis question in the 112-A 3rd exam means that 73% of the students tested got 75% or better in this question.

Batch of 2010-2011

<table>
<thead>
<tr>
<th>Course</th>
<th>Exam</th>
<th>Synthesis</th>
<th>Mechanism</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>112-A</td>
<td>3rd exam</td>
<td>73%</td>
<td>72%</td>
<td></td>
</tr>
<tr>
<td>112-A</td>
<td>Final Exam</td>
<td>Nomenclature 82%</td>
<td>Reaction 73%</td>
<td>Spectroscopy 81%</td>
</tr>
<tr>
<td>112-A</td>
<td>ACS Style</td>
<td>Overall 60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>112-B</td>
<td>3rd exam</td>
<td>Synthesis 78%</td>
<td>Mechanism 75%</td>
<td></td>
</tr>
<tr>
<td>112-B</td>
<td>Final Exam</td>
<td>Nomenclature 82%</td>
<td>Reactions 78%</td>
<td>Spectroscopy 85%</td>
</tr>
<tr>
<td>112-B</td>
<td>ACS style</td>
<td>Overall 73%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Batch of 2011-2012

<table>
<thead>
<tr>
<th>Course</th>
<th>Exam</th>
<th>Synthesis</th>
<th>Mechanism</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>112-A</td>
<td>3rd exam</td>
<td>63%</td>
<td>68%</td>
<td></td>
</tr>
<tr>
<td>112-A</td>
<td>Final Exam</td>
<td>Nomenclature 75%</td>
<td>Reaction 73%</td>
<td>Spectroscopy 78%</td>
</tr>
<tr>
<td>112-A</td>
<td>ACS Style</td>
<td>Overall 61%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C) Explanation of data findings

Note: Before the data can be analyzed fairly, it must be understood that organic chemistry is a very difficult course, probably the most challenging course the students have to take in their major. Traditionally most colleges award about 60% C grades in this course no matter where it is taught. Bigger schools like UC Berkeley “boast” of a 50% attrition rate right at the onset. At Ohlone college, based on articulation agreements this course is taught at the Upper division level and also transfers at the upper division in most universities. Sometimes in difficult cases, this upper division transfer is done by a simple phone call with the articulation officers at the UC’s and CSU’s. Almost all the colleges
within our articulation reach waive the requirement of the ACS exam when a student has
taken Organic Chemistry at Ohlone College. Needless to say that at Ohlone College this
course is taught very rigorously.

1. Proficiency in organic synthesis – fair to good.
Note: However by the end of the second semester this competency increases with more
practice, thus typically the 112-B students do better than the 112-A students. Organic
synthesis is THE most difficult part of the course and thus the numbers projected are an
indication of fair amount of strength in this area.

2. Proficiency in organic mechanisms – fair to good.
Note: Again, this is also a difficult part of the course and the numbers projected are an
indication of fair amount of strength in this area.

Note: The numbers are a strong indication that a huge population of the students in the
class are fairly proficient in this.

4. Proficiency in reaction – fair to good.
Note: There are about 200 reactions (and mechanisms) in this course which need to be
mastered making this course one of the most challenging chemistry course that the
student has to take. Considering the huge volume of reactions, these numbers are a
pretty good reflection of the class’s mastery over this subject.

5. Proficiency in Spectroscopy – very good.
Note: This area is also one of the MOST difficult in this course and clearly an area of
expertise for our students.

Note: The ACS National exam is based on a percentile. Students of most neighboring
CSU’s and UC’s place in the 50th percentile in this exam. Based on the numbers shown
(a) on the Chem 112 organic chemistry ACS exam data and (b) actual data from our
students who have taken this exam for Chemical Engineering majors, it is clear that our
students do very well in this exam.

8. Describe faculty dialogue (if any) in the assessment process.
The organic chemistry faculty is in constant touch with the teachers of the Chem 101
series. Dr. Maru Grant heads this course. The 101 teachers (especially adjunct faculty)
are constantly reminded of the expectation of organic chemistry faculty in terms of
material covered in the 101 series so that the students can adapt to the organic chemistry
course effortlessly. Towards that goal, a Learning Community was established between
Prof’s Niccolls, Grant, Baxter and Ganguly to achieve planarity in the transfer process
through discussions on how we can serve our students better by integrating course
materials in each others classes so that the transfer cohort can maximize their learning.

9. Based on an analysis of your findings and dialogue, describe revisions (if any) in
curriculum or teaching strategies implemented to promote student success.
As per the common tradition, organic chemistry students all over the map are the
weakest in synthesis and mechanisms. The students of Ohlone college are no different.
Both these area require a significant amount of practice. Guided practice in this area is
lacking. Although the 131-D hour that is provided is a mandatory hour for the students,
all the time during this hour is spent in doing difficult homework. Hardly any time can be assigned to guided practice of elaborate synthesis or mechanisms. Thus, except for what little practice is given in the classroom, students do not have a place to go for more practice sessions. A LAPSI tutor would be great in this area. However, the difficulty with this has been that almost all the organic chemistry students transfer by the end of the course and no good student is available to tutor the next generation of students. That has been the most challenging part of teaching this course. Perhaps another option would be to assign another hour to organic synthesis (similar to 131-D) in parts of lab periods (in a dry lab format) where the students actually don’t synthesize the material on the bench but come up with written strategies to do so. This would perhaps give them the practice they need. On a different note, assessment of safety should be featured into the course SLO’s at some point.

10. After the improvements are implemented, describe the results.
Implementation not yet in progress……