Honolulu Community College
General Education – DIVERSIFICATION DESIGNATION
Certification and Recertification
Application Form
Spring 2012

APPLICANT: Brent Rubio

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COURSE ALPHA and NUMBER: BIO C 251 CHEM 151

COURSE TITLE: Elements of Biochemistry

ELEMENTARY SURVEY OF CHEMISTRY

ESTIMATED NUMBER OF SECTIONS:
Fall: 0
Spring: 1

APPLICATION IS FOR:
☐ New Course  ☐ Modified Course  ☒ Existing Course  ☐ Re-designation

☐ Certification  ☒ Re-Certification. Date of last certification: 1/1/2012

DIVERSIFICATION AREA DESIGNATION SOUGHT:

☒ DA (Arts)  ☒ DP (Physical Sciences)
☐ DB (Biological Sciences)  ☐ DS (Social Sciences)
☐ DH (Humanities)  ☐ DY (Laboratory)
☐ DL (Literature and Language)

What percentage of the CONTENT of this course focuses on this diversification area? 80

What percentage of CLASS MEETINGS focuses on this diversification area? 80

Guidelines and explanatory notes for the following questions are located at the end of this document.
1. Hallmarks and SLOs. Please explain how course-specific SLOs align with the diversification area's hallmarks.

**DP.1: uses the terminology of the physical sciences**

SLO 1. To provide the beginning student with a non-rigorous but adequate background in the fundamentals of chemistry.
SLO 2. To acquire a familiarity with the terminology of chemistry.
SLO 3. To prepare students for Chem 161 (General Chemistry)
SLO 4. Understand the basic structures and reactivities of atoms, ions, and molecules, and ways to qualitatively and quantitatively describe the chemical and physical properties of various phases of matter, chemical reactions, and electronic configurations.
SLO 5. Introduce the concept of chemical equilibrium, the energies that drive chemical reactions and attain a basic understanding of solubility and solution chemistry with respect to acid-base (pH) and oxidation-reduction reactions.

This course provides the fundamentals of science that include topics in scientific method and measurements, defining observation, hypothesis, experimentation and theory and compares the imperial, metric and Système International (SI) units of measurement (SLO 1). Terminology taught in this chemistry course also is used in various other physical sciences (SLO 2) as students begin to understand basic ideas of chemistry like atoms, ions and molecules (SLO 4). Furthermore, introducing concepts like chemical equilibrium and pH shows how the terminology of this course is used in several physical sciences like physics and biology (SLO 5).

**DP.2: involves knowledge and theories relating to processes in the physical sciences**

SLO 1. To provide the beginning student with a non-rigorous but adequate background in the fundamentals of chemistry.
SLO 2. To acquire a familiarity with the terminology of chemistry.
SLO 3. To prepare students for Chem 161 (General Chemistry)
SLO 4. Understand the basic structures and reactivities of atoms, ions, and molecules, and ways to qualitatively and quantitatively describe the chemical and physical properties of various phases of matter, chemical reactions, and electronic configurations.
SLO 5. Introduce the concept of chemical equilibrium, the energies that drive chemical reactions and attain a basic understanding of solubility and solution chemistry with respect to acid-base (pH) and oxidation-reduction reactions.

As the basics of this course are introduced (SLO 1) and students become more familiar with terminology that they will see in other physical science courses (SLO 2), they are introduced to more specific chemical theories that provide for the fundamentals of the physical sciences. Scientific method, Dalton's Atomic Theory, and kinetic molecular theory are all introduced in this class with applications to other subjects like biology and physics (SLO 4), allowing the students to prepare for higher courses like Chem 161 (SLO 3).

**DP.3: demonstrates inquiry that involves observation/experiment and reasoning and mathematics**
SLO 1. To provide the beginning student with a non-rigorous but adequate background in the fundamentals of chemistry.
SLO 2. To acquire a familiarity with the terminology of chemistry.
SLO 4. Understand the basic structures and reactivities of atoms, ions, and molecules, and ways to qualitatively and quantitatively describe the chemical and physical properties of various phases of matter, chemical reactions, and electronic configurations.
SLO 5. Introduce the concept of chemical equilibrium, the energies that drive chemical reactions and attain a basic understanding of solubility and solution chemistry with respect to acid-base (pH) and oxidation-reduction reactions.

As the course progresses, and students learn the details of specific chemistry topics that employ the scientific methods of observation, reasoning and mathematics (SLO 1). For example, when students learn of the basic atomic structure, they see how observation and experimentation brought chemistry elements away from earth, air, fire and water into the atomic theory we know today that includes the proton, neutron and electron (SLO 2) and scientific reasoning to explain gas laws (SLO 4). Further, students learn how to use molar mass calculations to determine molecular formulas and employ more advanced logarithmic mathematics to determine how the concentration of an acid solution relates to pH (SLO 5).

2. Assessment strategies. Explain assessment strategies you have used (or plan to use) to measure the degree to which students exit the course with the course-specific SLOs. If there are multiple sections of the course taught by different instructors, please discuss how assessment is (or will be) carried out across instructors.

Formative and Summative assessments are used throughout this course as an assessment on the pace of the course and student comprehension of basic fundamentals and terminologies of chemistry. At the end of the course, students have the opportunity to assess the course and instructor in the form of student evaluations. There is only one instructor for this course per term.

Student assessments are formative and summative. Formative assessments come in terms of spot checks and simple questions posed to the entire class during lecture. Either verbal feedback or visual cues allow the instructor to do an on the spot check of the students current comprehension of material presentation (SLO 1, 2, ). Summative assessments of student comprehension are in forms of quizzes and exams (SLO 4, 5). Quizzes require written responses where students specifically demonstrate their detailed short-term comprehension by covering several chapters at a time. This also provides small benchmarks for the students to maintain good time management in their studies for the course. Exams in multiple-choice format covering half to a third of the course, allowing for the assessment of the student’s long-term comprehension of the material presented.

Instructor assessments come in forms of student evaluations given at the end of the semester, where students have the opportunity to voice their opinions on the course, material, pace and instructor. This gives direct feedback on the course. If the student progresses to Chem 161, their performance is monitored there by the current instructor to ensure the preparation they received in this course was adequate (SLO 3).

There is only one instructor for this course per term. If there is more than one in a term, then the instructors will all meet once a week to ensure courses are congruent and that assessment items are
3. **Assessment of assessment.** How have you used (or plan to use) the assessment findings to modify or improve this course? If there are multiple sections of the course taught by different instructors, please discuss how review of assessment results is (or will be) carried out across instructors.

Formative and summative assessments help to modify the course as it proceeds. As in class formative assessments occur, the pace of the lecture becomes slower or faster depending on the response (speed and accuracy) of the students. The summative assessments (quizzes and exams) help to modify the course itself to improve the experience for the students. If quizzes and exams show low curve averages, then the pace of the course slows down. If the curve average is good or high, the course pace maintains. This assessment of the assessments allows for a quick modification of the course, improving the course for the current students.

If the in course assessment reveal that some students require extra help, then the HCC system offers free tutorial services (math, comprehension, etc) to address these issues beyond the normal office hours and help from the instructor. This assessment of assessments improves the students’ performance in the course, and the course itself

Assessment of student evaluations allow for a more long-term improvement and modification of the course. Every semester, the instructor reviews the previous semester’s assessments to assess how to improve and modify the course from semester to semester. Also, if the students who have progressed to Chem 161 are assessed, their performance in that class is a direct assessment of that assessment. If students still continue to falter, than the specific areas of weakness will be emphasized more so in Chem 151.
DIVERSIFICATION BOARD DECISION:

☑ Approved
Re-Certification Due: Fall 2017

☐ Not approved
If not approved, reasons for disapproval:

Diversification Board Chair Signature: [Signature]
Date: 9/14/12
Chemistry 151: Elementary Survey of Chemistry
Fall 2012, CRN 20354
Building 5-208, MW, 8:30-9:45

Instructor: Brent K. Rubio, Ph.D.
Office Hours: Building 5-101E Tues:1-230pm, Wed:10-noon, Thur:10-1130am, or by appointment
Email: brubio@hawaii.edu

Course Description
Intended to provide the beginning student with a non-rigorous but adequate background in the fundamentals of chemistry. Suitable for students preparing for training in the life science and to those seeking a practical approach to chemistry. Will serve as preparation for Chem 161.

Text Book

Semester Grade
The breakdown of semester points is to the right. Final grades are determined from the total points at the end of the semester.
The following tentative scale is used for grades: A 90-100%; B 80-89%; C 65-79%; D 55-64%; F 0-54%.

Student Learning Outcomes
1. To provide the beginning student with a non-rigorous but adequate background in the fundamentals of chemistry.
2. To acquire a familiarity with the terminology of chemistry.
3. To prepare students for Chem 161 (General Chemistry)
4. Understand the basic structures and reactivities of atoms, ions, and molecules, and ways to qualitatively and quantitatively describe the chemical and physical properties of various phases of matter, chemical reactions, and electronic configurations.
5. Introduce the concept of chemical equilibrium, the energies that drive chemical reactions and attain a basic understanding of solubility and solution chemistry with respect to acid-base (pH) and oxidation-reduction reactions.

Exams
Due to the nature of this course, the Midterm Exams are cumulative, multiple choice, and worth 100 points. The Final Exam is cumulative, worth 200 points and consists of multiple choice and written sections. 50% of the exams will come directly from the textbook problems. Students must bring their Student ID, pencil(s) and a non-graphical scientific calculator to the exams. Sharing of supplies is forbidden.

Exam Dates: Midterm I (Sep 19), Midterm II (Oct 24), Final Exam (Monday, 10 Dec, 8:30-11:30AM)

Quizzes
Each quiz is worth 20 points, is not multiple-choice and is directly from the assigned homework problems. These quizzes also serve as your personal check system, to determine how well you understand the material and if you should be devoting more time to studying for this class. Students must bring their Student ID, sheet of paper, writing tools and a non-graphical scientific calculator to the quizzes. Sharing of supplies is forbidden.

Quiz Dates: Aug 29, Sep 12, Oct 08, Oct 17, Nov 21, Dec 03

Make Up Policy
Make-ups are not allowed. There is absolutely no allowance to re-take anything for a better grade. If you have a scheduling conflict with any of the exams, signed documentation from your advisor, commander, coach, et cetera is needed to take an early, non-multiple choice exam and will be allowed on a case by case basis. There are no early quizzes. Employment is not a reason to miss a gradable item.

Articulation: This course fulfills a physical science requirement for Honolulu Community College for the AA degree and a DP requirement at the University of Hawaii - Manoa
Attendance and Extra Credit
Attendance is not taken in this course. Instead, there are five extra credit opportunities throughout the session. These will take place during unannounced lecture times. Each extra credit is worth a 1% point increase of your final grade.

Student ACCESS (http://honolulu.hawaii.edu/disability)
Student ACCESS provides coordinated services to help students with documented disabilities achieve their educational goals. Students requiring disability accommodations should submit requests in advance to HCC's Student ACCESS Office with appropriate disability documentation. For more information visit the Student ACCESS web site or call 844-2392 (voice/text).

Classroom Etiquette = Movie Theatre Etiquette
Cheating and Plagiarism
There is a zero tolerance policy on cheating and plagiarism. Integrity is hallmark in science and violations of the Student Conduct Code could result in an “expulsion.” It is not worth the risk. (www.studentaffairs.manoa.hawaii.edu/policies/conduct_code/)

Homework Questions and Problems
“Skill Builder Excercises” and “Conceptual Checkpoint” problems should be understood in the chapter texts. The following suggested homework questions and problems found at the end of the chapters are not collected in this course. However, quiz questions and 50% of exams are derived directly from these homework problems.

*This course does not utilize www.masteringchemistry.com or i-clicker.

(in ranges below, do odd numbers only. For example: 1 – 11 means 1, 3, 5, 7, 9, 11)

Ch 1: 2, 5, 7, 10, 12, 18, 22
Ch 2: 1, 5, 7, 9, 10, 11, 14, 19, 21, 22, 25, 27, 29, 31 – 39, 69 – 101, 105, 109, 111, 115, 121
Ch 3: 3, 5, 9, 10, 11, 12, 15, 17, 19, 21, 22, 25, 29, 31 – 73, 111, 114
Ch 4: 1, 2, 3, 5, 8, 9, 11, 13, 14, 15, 18, 20, 22, 25, 27, 31, 33 – 99, 103, 107, 108, 113
Ch 5: 1 – 9, 15, 16, 17, 20, 25 – 75, 83, 85, 95, 97, 99, 101
Ch 6: 1, 3, 7, 9, 10, 11, 13, 16, 17, 18, 19, 21 – 69, 79, 81, 85, 89, 97, 98, 99, 101, 109 – 113, 117, 118, 119, 120
Ch 7: 3, 5, 7, 90, 11, 1215, 17, 19, 20, 21, 23, 25 – 67, 89, 93, 99, 109
Ch 8: 1, 7, 4, 5, 9, 7, 8, 9, 11, 15 – 67, 69, 70, 77, 79, 83
Ch 9: 2, 3, 55, 21, 23, 24, 25, 29 – 99, 105
Ch 10: 2, 3, 4, 5, 6, 7, 9, 11, 13, 14, 15, 17, 19, 20, 21, 22, 23 – 89, 90, 91, 92, 93 – 109
Ch 12: 1, 2, 3, 7, 9, 13, 17, 23, 24, 25, 26, 29, 30, 33, 39, 45, 59, 61, 63, 65, 69, 73, 79, 91, 93
Ch 15: 1, 2, 3, 5, 6, 9, 12, 13, 18, 19, 20, 21, 22, 26, 39 – 89, 93, 95
Ch 13: 1, 2, 3, 6, 7, 11, 15, 21, 23 – 31, 37 – 95, 107 – 113, 117 – 121
Ch 14: 1, 5, 10, 11, 17, 21, 33 – 87, 91, 93, 95, 97, 105, 109, 110, 111, 112, 113, 114, 117
Ch 16: 1, 2, 3, 4, 33, 35, 37, 43, 44, 95, 96
Course Content: *Very Tentative* Weekly Schedule

<table>
<thead>
<tr>
<th>Week of</th>
<th>Chapter and Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 20</td>
<td>Ch 1 – 2: Chemistry and Measurements</td>
</tr>
<tr>
<td>Aug 27</td>
<td>Ch 3 – 4: Matter, Energy, Atoms and Elements</td>
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<td>Aug 29</td>
<td>Quiz 1 (Ch 1, 2)</td>
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<tr>
<td>Sep 03</td>
<td>NO CLASS: <em>Labor Day</em></td>
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<tr>
<td>Sep 05</td>
<td>Ch 5: Molecules and Compounds</td>
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<tr>
<td>Sep 10</td>
<td>Ch 5 – 6: Chemical Composition</td>
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<tr>
<td>Sep 12</td>
<td>Quiz 2 (Ch 3, 4)</td>
</tr>
<tr>
<td>Sep 17</td>
<td>Ch 6: Molecular Calculations</td>
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<tr>
<td>Sep 19</td>
<td>Exam 1 (Ch 1 – 5)</td>
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<td>Sep 24</td>
<td>Ch 7 -8: Chemical Reactions</td>
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<tr>
<td>Oct 01</td>
<td>Ch 8: Stoichiometry, Quantities in Chemical Reactions</td>
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<tr>
<td>Oct 03</td>
<td>Quiz 3 (Ch 6, 7)</td>
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<td>Oct 08</td>
<td>Ch 9, 10: Electrons and the Periodic Table</td>
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<td>Oct 15</td>
<td>Ch 10: Chemical Bonding</td>
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<td>Oct 17</td>
<td>Quiz 4 (Ch 8, 9)</td>
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<tr>
<td>Oct 22</td>
<td>Ch 11: Gases</td>
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<tr>
<td>Oct 24</td>
<td>Exam II (Ch 6 – 10)</td>
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<tr>
<td>Oct 29</td>
<td>Ch 12: Liquids and Solids</td>
</tr>
<tr>
<td>Nov 05</td>
<td>Ch 15, 13: Chemical Equilibrium</td>
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<tr>
<td>Nov 12</td>
<td>NO CLASS: <em>Veteran’s Day</em></td>
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<tr>
<td>Nov 14</td>
<td>Ch 13: Solutions</td>
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<tr>
<td>Nov 19</td>
<td>Ch 14: Acids and Bases</td>
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<tr>
<td>Nov 21</td>
<td>Quiz 5 (Ch 12, 15)</td>
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<tr>
<td>Dec 03</td>
<td>Ch 16: Oxidation and Reduction</td>
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<td>Quiz 6 (Ch 13, 14)</td>
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<td>Final Exam Review</td>
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<tr>
<td>Dec 10</td>
<td>Final EXAM, Monday, 8:30 – 11:30 AM (Cumulative)</td>
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