

## Section 1. Proposal Information

### Course Developer:

Doug Young

Date: 10/2/2012

Catalog year to take effect : 2013-2014

### Type of Proposal

- ☒ Revised course
- ☐ 199 Special Studies
- ☐ 299 Trends

### Type of Course:

- ☒ Lower Division Collegiate (transfer)
- ☐ Professional/Technical (program requires)
- ☐ Professional/Technical (stand-alone)
- ☐ Developmental, numbered below 100

### Rationale:

#### How does this proposal further the goals of the program or department?

Since BioBonds, a learning community for allied health students, was first introduced as a prerequisite to LCC's Anatomy and Physiology, CH 112 has evolved to address a changing student population and an increased number of course topics. One of the main goals of CH 112 is to provide students with the chemical fundamentals necessary for success in the Anatomy and Physiology sequence and ultimately in their classes/careers in health professional programs. The proposed credit change reflects the reality that this course no longer includes labs as a result of the additional discussion/lecture time needed to address new topics, student preparedness and critical thinking skills.

The proposed 3 to 4 credit conversion is important to the Science Division because it represents a truth in advertising, signaling a workload equivalent to other 4 credit chemistry offerings, it helps the course to align with LCC credit hour guidelines, and transforms CH 112 into a transferrable course. Currently the student workload in CH 112 is equivalent to 4-credit, 100-level offerings in chemistry. It is important to note that most chemistry courses at LCC and other Oregon colleges and universities are either 4 or 5 credits, making the current 3 credit class non-transferrable. Increasing the course to 4 credits will allow students who do not continue on in one of the health careers offered here at LCC to more directly transfer CH 112 as an introductory chemistry class to other schools (e.g. Chemistry 111 at the University of Oregon).

#### What evidence supports this proposal?

The division, students and faculty all support the change of 3 to 4 credits for CH 112. The chemistry discipline recognizes that the course no longer contains a lab component, meets for 4 lecture hours a week, and therefore should be 4 credits. Both the full- and part-time faculty agree that the workload for CH 112 is equivalent to other 4 credit offerings in Science. A survey of 132 BioBonds students last year revealed that students in CH 112 overwhelmingly support the 3 to 4 conversion (93%) for myriad reasons. Lastly, in a meeting with the health professional program coordinators (nursing, respiratory care, EMT, etc), they expressed support for the conversion of CH 112 to a 4 credit, transferrable course as well.

(New courses) How do you know there is a demand for this course?

### PREVIOUS Catalog/Course Information:

Course Number: **CH 112** Course Title in Banner: **Chemistry - Health Occupations** (30 characters maximum)

Full Course Title in print catalog: **Chemistry for Health Occupations**

Prerequisites: **MTH 052** Co-requisites: **BI 112**

Grade Option: ☒ Graded (with P/NP option) ☐ Pass/No Pass only

Number / Type Credits	Term Minimum Contact	Term Maximum Contact	11-Week Term Contact
<u>2</u> Lecture	<u>20</u> hours (lecture credits x 10)	<u>24</u> hours (lecture credits x 12)	<u>22</u> hours (lecture credits x 11)
<u>1</u> Lec/Lab	<u>20</u> hours (lec-lab credits x 20)	<u>24</u> hours (lec-lab credits x 24)	<u>22</u> hours (lec-lab credits x 22)
<u>  </u> Lab	<u>  </u> hours (lab credits x 30)	<u>  </u> hours (lab credits x 36)	<u>  </u> hours (lab credits x 33)
<b><u>3</u> Total credits (sum)</b>	<b><u>40</u> Total hours (sum)</b>	<b><u>48</u> Total hours (sum)</b>	<b><u>44</u> Total hours (sum)</b>

#### What will change in this course as a result of changing the credits?

- ☒ Course Description      ☒ Course Outline      ☐ Contact Hours

☒ Course Outcomes

☒ Other (explain): Allocation of hours/credits

**Section 2. Proposed Course Outline** (A general statement of course content that informs class syllabus construction.)

Course Number: **CH 112** Course Title for Banner: **Chemistry - Health Occupations** (30 characters maximum)

Full Course Title for print catalog: **Chemistry for Health Occupations**

Prerequisites: **MTH 052** Co-requisites: **BI 112**

Grade Option: ☒ Graded (with P/NP option) ☐ Pass/No Pass only

Number / Type Credits	Term Minimum Contact	Term Maximum Contact	11-Week Term Contact
<u>4</u> Lecture	<u>40</u> hours (lecture credits x 10)	<u>48</u> hours (lecture credits x 12)	<u>44</u> hours (lecture credits x 11)
<u>  </u> Lec/Lab	<u>  </u> hours (lec-lab credits x 20)	<u>  </u> hours (lec-lab credits x 24)	<u>  </u> hours (lec-lab credits x 22)
<u>  </u> Lab	<u>  </u> hours (lab credits x 30)	<u>  </u> hours (lab credits x 36)	<u>  </u> hours (lab credits x 33)
<u>4</u> <b>Total credits (sum)</b>	<u>40</u> <b>Total hours (sum)</b>	<u>48</u> <b>Total hours (sum)</b>	<u>44</u> <b>Total hours (sum)</b>

**Original Course Description:**

Introduction to atoms, states of matter, bonding, energy, acid/base and buffer chemistry, organic and biological chemistry including lipids, carbohydrates, nucleic acids, proteins, and metabolic pathways. Lecture/recitation and laboratory. With BI 112, the prerequisite for BI 231 Anatomy and Physiology 1.

**New Course Description (1000 character limit):**

Introduction to atoms, compounds, bonding, acid/base chemistry and chemical reactions relevant to biological systems. Topics include metabolic pathways and the function and structure of carbohydrates, lipids, proteins and nucleic acids. Lecture/Recitation. With BI 112, the prerequisite for BI 231 Human Anatomy and Physiology 1.

**Original Course Outcomes and Proficiencies**

What did the student *know*, what could the student *do* at the end of the course, or what *attitudes* related to the subject would the student hold?

**Upon successful completion of this course, the student:**

A. Describe the structural levels of particulate matter, including the cell as the basic unit of life.

B. Relate the causes and consequences of water's polarity to its importance in cellular processes.

C. Summarize the chemistry of carbon and the role of functional groups in determining organic compound properties.

D. Explain how the structure and chemistry of small precursor molecules contribute to the diversity of

**Assessments Used**

What evidence did you gather that students have achieved course outcomes? (assessment tools include departmental tests, written products, portfolios, juried performances, quizzes and exams, or alternative assessments such as qualitative studies, capstone projects, external reviewers, etc.)

**How each outcome was assessed:**

A. Homework, Quizzes and Exams

B. Homework, Quizzes and Exams

C. Homework, Quizzes and Exams

D. Homework, Quizzes and Exams

biomolecules.

E. Describe and model processes that occur in chemical reactions, including acid/base equilibria. E. Homework, Quizzes and Exams

F. Outline major matter and energy transformations associated with metabolic pathways in human cells. F. Homework, Quizzes and Exams

### **New Course Outcomes and Proficiencies**

What will the student *know* or *be able to do* at the end of the course, or what *attitudes* related to the subject will the student hold?

#### **Upon successful completion of this course, the student will:**

A. Describe the structural levels of particulate matter, from subatomic particles to macromolecules.

B. Describe the consequences and origin of water's polarity and its importance to cellular structure and processes.

C. Predict the physical and chemical properties of organic compounds based on structure and functional groups.

D. Explain how the structure and chemistry of small precursor molecules contribute to the diversity of biomolecules.

E. Analyze, describe and model processes that occur in biochemical reactions, such as redox and acid/base chemistry.

F. Outline important metabolic processes that occur in human cells and the associated matter and energy transformations.

### **Assessments Planned**

What evidence will you have that students have achieved course outcomes? (assessment tools may include departmental tests, written products, portfolios, juried performances, quizzes and exams, or alternative assessments such as qualitative studies, capstone projects, external reviewers, etc.)

#### **How each outcome will be assessed:**

A. Homework, Portfolios, Quizzes and Exams

B. Homework, Portfolios, Quizzes and Exams

C. Homework, Portfolios, Quizzes and Exams

D. Homework, Portfolios, Quizzes and Exams

E. Homework, Portfolios, Quizzes and Exams

F. Homework, Portfolios, Quizzes and Exams

### **Original Course Content by Major Topics**

What topics were originally presented? What were the main activities of the course? What were the central themes?

#### **I) Atoms and Molecules**

The Periodic Table of Elements

Atomic Structure

Periodic Trends

Chemical Compounds

Chemical formulae and nomenclature

Ionic, Polar Covalent, Non-polar Covalent bonds

Properties of Compounds

## Water

- Hydrogen bonding
- Solubility and solutions
- Measurements of concentration

## II) Introduction to Organic Chemistry

- Carbon chemistry, formulae, structural representations
- Common functional groups

## Lipids

- Definition, properties and function
- Introduction to dehydration synthesis and hydrolysis

## Carbohydrates

- Definition, properties and function
- Common mono-, di-, and polysaccharides
- 5- vs 6-membered rings

## Proteins

- Definition, structure and functions of amino acids
- Functions of proteins
- Residue groups – relationship to properties and function
- Di- and polypeptide structures
- Primary, secondary, tertiary and quaternary structure of proteins

## Nucleic Acids

- Definition and function
- Components of a nucleic acid
- Transcription and translation of genetic material
- Compare and contrast RNA and DNA structure

## III) Chemical Reactions

- Types of Reactions
- Thermodynamics
  - Energy Diagrams
- Kinetics
  - Reaction Rates
  - Activation Energy
  - Enzyme function and properties
- Chemical Equilibria

## Metabolism

- Global Carbon cycle
- Anabolism and Catabolism
- Metabolic pathways
- Respiration

## New Course Content by Major Topics

What topics will be presented? What are the main activities of the course? What are the central themes?  
(See sample at <http://www.lanecce.edu/cops/format3.htm>.)

## I) Atoms and Molecules

- The Periodic Table of Elements
  - Atomic Structure
  - Periodic Trends

## Chemical Compounds

- Chemical formulae and nomenclature
- Ionic, Polar Covalent, Non-polar Covalent bonds
- Properties of Compounds

## Water

- Hydrogen bonding
- Solubility and solutions
- Measurements of concentration
- Osmosis vs Diffusion

## II) Introduction to Organic Chemistry

- Carbon chemistry, formulae, structural representations
- Common functional groups

## Lipids

- Definition, properties and function
- Introduction to dehydration synthesis and hydrolysis

## Carbohydrates

- Definition, properties and function
- Common mono-, di-, and polysaccharides
- 5- vs 6-membered rings
- $\alpha$  vs  $\beta$  linkages

## Proteins

- Definition, structure and functions of amino acids
- Functions of proteins
- Residue groups – relationship to properties and function
- Di- and polypeptide structures
- Primary, secondary, tertiary and quaternary structure of proteins

## Nucleic Acids

- Definition and function
- Components of a nucleic acid
- Compare and contrast RNA and DNA structure

## III) Chemical Reactions

- Types of Reactions
- Thermodynamics
  - Energy Diagrams
- Kinetics
  - Reaction Rates
  - Activation Energy
  - Enzyme function and properties
- Chemical Equilibria (K)
  - Le Chatelier's Principle

## Metabolism

- Global Carbon cycle
- Anabolism and Catabolism
- Metabolic pathways
- Respiration
  - Glycolysis
  - Formation of Acetyl-CoA
  - Citric Acid Cycle
  - Oxidative Phosphorylation
- $\beta$ -oxidation of Fatty Acids

### **Section 3. Curriculum Equity** (<http://www.lanecc.edu/cops/curric.htm>)

To promote an environment where all learners are encouraged to develop their full potential, this course will support Lane's Curriculum Equity policy in the following way(s):

- Portraying women and men from diverse cultural and ethnic background in a wide range of roles.
- Using gendered examples equally when illustrating theories and concepts.
- Using class material which assists students in clearly recognizing and accepting basic similarities among all members of the human race as well as the uniqueness and worth of every individual.

## Section 4. Required Signatures

### Library Impact Statement

Under accreditation standards, Library consultation is essential for new programs, new courses and for substantively revised courses when the revisions entail any change in library use.

#### What assignments will require the use of library and information resources?

Each academic area has a Liaison Librarian (<http://www.lanecc.edu/library/liaison.htm>) to help faculty identify materials to be ordered to support the curriculum. Make an appointment with the designated librarian to discuss the library needs of your course at least a week ahead of the deadline for submission.

#### To be completed by Liaison Librarian:

- ☐ Library resources are adequate to support this proposal.
- ☐ Additional resources are needed but can be obtained from current funds.
- ☐ Significant additional Library funds/resources are required to support this proposal.

\_\_\_\_\_  
Liaison Librarian

\_\_\_\_\_  
Date

### Divisional Approvals

#### Human, Physical, and Financial Resources (select one):

- ☐ Additional instructional costs (staff, materials, services or facilities) will be incurred to offer this course. Source of funding: \_\_\_\_\_
- ☐ No additional instructional resources (staff, materials, services or facilities) are needed to offer this course.  
Explain: \_\_\_\_\_

#### Divisional Recommendation (select one):

- ☐ The Division Chair and Administrative Assistant have reviewed this course proposal and kept a copy for divisional files.
- ☐ Faculty review of this course was completed within the division on \_\_\_\_\_(date).
- ☐ New course outlines have been prepared for the Divisional binder containing all current course outlines.

\_\_\_\_\_  
Office Administrator

\_\_\_\_\_  
Date

#### Fees (select one):

- ☐ We have completed a fee request form to be submitted to ASA upon course approval.
- ☐ No special fees will be required for this course.

#### Required Certifications:

- ☐ We have developed minimum course certification standards for this course to be filed with ASA to allow compliance with the faculty contract.
- ☐ We have completed faculty certification form(s) (<http://www.lanecc.edu/cops/faccertf.pdf>) for this course to be filed with ASA and Human Resources so RIF grid information will be updated.

#### Divisional Recommendation (select one):

- ☐ Pass ☐ Do Not Pass

\_\_\_\_\_  
Division Chair

\_\_\_\_\_  
Date

### College Approval

\_\_\_\_\_  
Curriculum Committee Chair

\_\_\_\_\_  
Date

\_\_\_\_\_  
Executive Dean for Academic Affairs

\_\_\_\_\_  
Date

Curriculum Approval Committee hearing:

\_\_\_\_\_  
Date

\_\_\_\_\_  
Vice President for Academic Affairs &  
Chief Academic Officer

\_\_\_\_\_  
Date