

**Section 1. Proposed Course Outline** (A general statement of course content that informs class syllabus construction. Once approved, all sections of a given course must include this content, no matter which instructor teaches the course, or the mode of delivery. Divisions must include this new course outline in the Divisional Course Outline binder as required by COPPs.)

Course Number: **CH 106** Full Course Title for print catalog: **Introductory Chemistry 3**

Abbreviated Course Title for Banner: **Introductory Chemistry 3** (30 character limit)

Prerequisites: CH 104 or permission of the instructor

Co-requisites:

Grade Option: [x]  Graded (with P/NP option)  [ ]  Pass/No Pass only

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| **Number/Type Credits** | **Term Minimum Contact** | **Term Maximum Contact** | **11-Week Term Contact** |
| 4 Lecture | 40 hours (lecture credits x 10) | 48 hours (lecture credits x 12) | 44 hours (lecture credits x 11) |
|    Lec/Lab |    hours (lec-lab credits x 20) |    hours (lec-lab credits x 24) |    hours (lec-lab credits x 22) |
| 1 Lab | 30 hours (lab credits x 30) | 36 hours (lab credits x 36) | 33 hours (lab credits x 33) |
| 5 **Total credits (sum)** | 70 **Total hours (sum)** | 84 **Total hours (sum)** | 77 **Total hours (sum)** |

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| **Course Description (300 character limit):** |
| The second term of the standard General, Organic and Biological Chemistry sequence. This introduction to organic and biological chemistry includes hydrocarbons, alcohols, aldehydes, carboxylic acids, carbohydrates, lipids, proteins and an introduction to metabolic pathways. Lecture and lab. |
| **Course Outcomes and Proficiencies** | **Assessments Planned** |
| What will the student ***know*** or ***be able to do*** at the end of the course?What ***attitudes*** related to the subject will the student hold? | What evidence will demonstrate 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.) |
| **Upon successful completion of this course, the student will:** | **How each outcome will be assessed:** |
| Compare and contrast the structure, function and metabolism of carbohydrates, lipids and proteins. | Exams, quizzes, in-class group work, weekly laboratory exercises, reports/presentations  |
| Predict chemical composition, shape and properties and to use this information to explain natural phenomenon on the nano­ and macroscopic scale.  | Exams, quizzes, in-class group work, weekly laboratory exercises, reports/presentations |
| Given a chemical transformation, classify the reaction and describe and quantify the outcomes. | Exams, quizzes, in-class group work, weekly laboratory exercises, reports/presentations |
| Apply the Laws of Thermodynamics to describe and calculate changes in energy during transformations of matter. | Exams, quizzes, in-class group work, weekly laboratory exercises, reports/presentations |
| In a laboratory setting, collect data, safely use common glassware, and apply lab techniques ubiquitous in organic and biochemistry to form evidence-based conclusions. | Weekly laboratory exercises, reports/presentations |
| Logically communicate complex chemical phenomenon orally and written explanations. | Exams, quizzes, in-class group work, weekly laboratory exercises, reports/presentations |
| Critically analyze and develop arguments supporting or denying nutritional/biochemical studies and media claims. | Exams, in-class group work, weekly laboratory exercises, reports/presentations |

**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.lanecc.edu/copps>

**Topics:**

1. Introduction to Organic Chemistry
	1. Origin of Organic Chemistry
	2. Hydrocarbons and nomenclature
	3. Review of attractive forces
	4. Reactions of alkenes: hydration and redox
		1. Review of Energy diagrams
		2. Thermodynamics
		3. Kinetics
2. Alcohols and Ethers
	1. Definitions and background
	2. Naming and properties
	3. Reaction types: Condensation and Hydrolysis
3. Chirality
	1. Biological significance
	2. Identifying chiral molecules
	3. Fisher projections
4. Aldehydes and Ketones
	1. Definitions and background
	2. Naming and properties
	3. Reaction types: Redox reactions
5. Carbohydrates
	1. Definitions and background
	2. Functions
	3. Monosaccharides
	4. Disaccharides
	5. Polysaccharides
6. Carboxylic Acids and Esters
	1. Definitions and background
	2. Naming and properties: acidity
	3. Reaction types: add transesterification
7. Lipids
	1. Definitions and background: triglycerides, steroids, phospholipids, etc.
	2. Functions
	3. Cell membranes
8. Amines
	1. Definitions and background: neurotransmitters
	2. Properties: basicity
	3. Reaction types: condensation and hydrolysis
9. Amino Acids and Proteins
	1. Definitions and background
	2. Amino acid classification
	3. Dipeptides
	4. Protein structure: primary through quaternary
	5. Denaturation
10. Enzymes and Vitamins
	1. Definitions and background: compare and contrast
	2. Functions
	3. Factors Affecting Enzyme Activity
	4. Regulation of Enzymes
	5. Cofactors and Vitamins
11. Metabolic Pathways
	1. Overview of Metabolism: Global Carbon Cycle and energy
	2. Carbohydrates
		1. Digestion
		2. Glycolysis
		3. Fate of Pyruvate: Formation of Acetyl CoA
	3. Citric Acid Cycle
	4. Oxidative Phosphorylation
		1. Electron transport chain and formation of ATP
	5. Lipids
		1. Digestion
		2. Carnitine shuttle
			1. Fatty acid activation
		3. Beta oxidation of fatty acids
	6. Energy Comparison: Carbs vs Fats

**Section 2. Proposal Information**

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| --- | --- | --- |
| **Course Developer:** | **Type of Proposal** | **Type of Course:**  |
| Doug Young | [ ]  New course | [x]  Lower Division Collegiate (transfer)  |
| Date: 11/18/2015 |  [ ]  Currently 199 or 299  | [ ]  Professional/Technical (required or elective)  |
| Catalog year to take effect:  | [ ]  Experimental Course | [ ]  Developmental, numbered below 100 |
| 2016-2017\_\_X\_  |  [ ]  199 Experimental Course |  |
|  |  [ ]  299 Experimental Course |  |
|  | [ ]  Revised course (If increasing credits, use credit change form) |
|  | [ ]  Reactivated course with no change |
|  | **X** Reactivated course with changes  |

**Rationale:**

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| How does this proposal further the goals of the program or department?  |
| The addition of Introductory Chemistry II (CH 106) will further a number of goals within the Chemistry discipline and the Science Division. Currently LCC is one of the few Oregon Community College without a full General, Organic and Biological Chemistry (GOB) sequences for non-majors. Filling this gap will address a number of issues. At this time, the Chemistry discipline only offers one 5 credit, 100-level course. By offering a second, CH 106, students will be able to pursue an interest in chemistry while meeting AAOT lab science requirements. Currently, 36% of students who complete CH 104 (Intro Chem I) plan to take the first term of the majors level General Chemistry sequence (CH 221) in order to get a second lab course in chemistry - this is not an appropriate class for them (it repeats content, has a higher math pre-requisite, and is designed for a different audience). Adding Intro Chem II back will allow CH 104 students (60% of whoms expressed interest in taking CH 106) to meet their AAOT requirements with a course that is appropriate for non-majors while providing chances to engage with new concepts and ideas (how molecular properties and reactivity explain the behavior of biological systems) while meeting their educational goals. Introductory Chemistry II will add breadth and depth to the Chemistry Discipline and Science Department as a whole.Another important consideration is that Intro Chemistry I (CH 104) is often not a good choice for students with strong backgrounds in chemistry (from High School or previous training) because the repeat in content does not help to facilitate engagement with the material. Adding Intro Chemistry II (CH 106) will provide a content appropriate course that will meet the intellectual and educational needs of our students.Lastly, the addition of CH 106 will provide an additional route to students looking to take Anatomy and Physiology (BI 231) at LCC or any other community college in Oregon. Currently at Lane, BI 231 has a chemistry pre-req of CH 112 (Chemistry for Health Occupations, a 4-credit, lecture only, GOB course) that is part of a learning community with BI 112 (Cell Biology). While many students thrive in the fast paced BioBonds learning community, a large number of students (over 20%) fail and do not meet their educational goals. These students retake CH 112 over and over, go back and take CH 104 to get a better understanding of chemistry fundamentals, or abandon their career path. For students who benefit from the inclusion of laboratory exercise and a less accelerated pace, taking CH 104 then CH 106 would be a superior option. Not only do these classes typically have a higher success rate, they both meet AAOT lab science requirements (while CH 112 does *not* since there is no lab component). LCC considers the terminal course in any Oregon GOB sequence as equivalent to CH 112. |
| What assessment evidence supports this proposal?  |
| The majority of the rationale given is simply stating gaps in our curriculum. We do not have a complete GOB sequence and the terminal course (CH 106) is a requirement for many programs across the state. We have polled CH 104 students to get data on interest and demand for CH 106. We also used student data when comparing the pass rates of students taking CH 112 (70%) versus a more traditional 100-level course like CH 104 (92%). Furthermore, a poll of CH 112 students indicates that 15% of students (350+ annually) would have preferred to take CH 104 and CH 106 instead of CH 112 only. All of the Chemistry Faculty (contracted and part-time) supports the formation of CH 106. |
| How do you know there is a demand for this course?  |
| We have polled our students in CH 104 and asked what their interest in a course like CH 106 was, were they likely to take it, and what their second AAOT science lab course was likely to be. Approximately 60% of the CH 104 students were interested in taking a CH 106 course if it were offered. Also, CH 106 is a requirement for many programs (radiology, dental hygiene, anatomy and physiology) at other Oregon community college where our students may be transferring. We often get requests/questions about CH 106 for this reason. |

**Section 3. Curriculum Equity** [**http://www.lanecc.edu/copps**](http://www.lanecc.edu/copps)

**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):**

Introductory Chemistry II will support Lane’s Curriculum Equity policy by providing opportunities to expose students to a culturally and ethnically diverse group of male and female scientists who contributed their genius to growing the body of chemical knowledge. The use of gendered pronouns will be used minimally, but equally. The study of chemistry inherently forces students to recognize the similarities among, not only the human race, but of all life as we know it.

**Section 4. For revised courses only: PREVIOUS Catalog/Course Information:**

Course Number: Course Title in Banner: (30 characters maximum)

Full Course Title in print catalog:

Prerequisites:

Co-requisites:

Grade Option: [ ]  Graded (with P/NP option) [ ]  Pass/No Pass only

|  |  |  |  |
| --- | --- | --- | --- |
| **Number/Type Credits** | **Term Minimum Contact** | **Term Maximum Contact** | **11-Week Term Contact** |
|    Lecture |    hours (lecture credits x 10) |    hours (lecture credits x 12) |    hours (lecture credits x 11) |
|    Lec/Lab |    hours (lec-lab credits x 20) |    hours (lec-lab credits x 24) |    hours (lec-lab credits x 22) |
|    Lab |    hours (lab credits x 30) |    hours (lab credits x 36) |    hours (lab credits x 33) |
|    **Total credits (sum)** |     **Total hours (sum)** |     **Total hours (sum)** |     **Total hours (sum)** |

**Course Description:**

What will change? [ ] Course Number [ ] Title [ ] Course Description [ ] Credit hours [ ] Contact hours

**Section 5. Support Courses (New Professional/Technical course proposals must complete.)**

Professional/Technical courses are tracked within programs for purposes of Carl Perkins funding and budgetary planning. Indicate all degree or certificate programs for which this course will be required.

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| --- | --- |
| Program | Division |
|       |       |
|       |       |

**Section 6. Overlap Courses (New course proposals must complete.)**

While overlap of course materials is not necessarily a flaw, duplication of course materials may lead to inefficient use of college resources. If there is overlap, the faculty of overlapping courses must agree on the extent of overlap and attach a rationale explaining its necessity if it is more than 10%.

Indicate all departments/courses that this course may overlap. Division Dean of existing course enters one of two options at right. Note: N/A is not an option.

Options:

1. No overlap.

2. Approved: overlap is acceptable. Rationale attached.

3. Disapproved: reasons attached.

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| --- | --- | --- | --- | --- | --- |
| Division | Course Number / Title | % Overlap | Option | Division Dean of existing course(Signature required for all options) | Date |
| Science | CH 112Chemistry for Health Occupations | 10% | 2 |  |       |
|       |       |       |       |  |       |

**Section 7. Qualification to fulfill degree requirements** (complete all relevant forms, available at <http://www.lanecc.edu/currsched/curriculum-forms> and send to Curriculum/Scheduling for the Degree Requirements Review Committee):

[x]  Form(s) applying for the following degree requirement status have been attached. (Only check this box when forms have been completed and attached.)

**AAOT, ASOT-Bus, OTM:**

[ ]  Arts & Letters

[ ]  Social Sciences

[x]  Science /Computer Science

[ ]  Mathematics

[ ]  Cultural Literacy Option

(please submit with course syllabus to Michael Samano in Social Science)

**All degrees:**

[ ]  Health/Wellness/Fitness

**AAS, 1-year and 2-year certificates:**

[ ]  Human Relations

**Optional designation:**

[ ]  Sustainability status

**Section 8. 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?**

Students will complete a report in which they research a biomolecule of interest. They will be able to use resources online and at the LCC Library. Extra resources are not required.

Each academic area has a Liaison Librarian <http://www.lanecc.edu/library/services/liaison.htm>. Contact the designated librarian to discuss the library needs of your course. Please allow the librarian at least one week to assess library resources.

**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

**Section 9. Divisional Approval** (To be completed by Division Chair and Administrative Assistant)

**Human, Physical, and Financial Resources:**

[ ]  Additional instructional costs (staff, materials, services or facilities) will be incurred to offer this course. Source of funding:

[x]  No additional instructional resources (staff, materials, services or facilities) are needed to offer this course.
Explain: Current faculty is trained to teach the course. No net increase in chemistry classes is projected at this time.

**Required Certifications:**

[x]  We have developed minimum course certification standards according to the COPPs procedure “Instructor Qualifications: Credit,” to be filed with ASA upon course approval.

[x]  We have completed faculty certification form(s) for faculty qualified to teach this course, to be filed with ASA and Human Resources upon course approval.

 12/11/2015

Administrative Assistant/Coordinator Date

**Fees:**

[x]  We have completed fee rationale and fee request forms to be submitted to ASA upon course approval, in compliance with the COPPs procedure, “Fees: Special”

[ ]  No special fees will be required for this course.

**Divisional Recommendation:**

[x]  The Academic Dean and Administrative Assistant have reviewed this course proposal and kept a copy for divisional files.

[x]  Faculty review of this course was completed within the division on 12/9/2015(date).

[x]  Pass [ ]  Do Not Pass

 12/11/2015

Academic Dean Date

**Section 10. College Approval**

Curriculum Committee Chair Date Executive Dean for Academic Affairs Date

Curriculum Approval Committee hearing:       \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Date Vice President for Academic & Date

 Student Affairs