

Clackamas Community College

Online Course/Outline Submission System

 Show changes since last approval in red**Section #1 General Course Information****Department:** Sciences**Submitter**

First Name: Nick

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Course Prefix and Number: CH - 223

Credits: 5**Contact hours**

Lecture (# of hours): 44

Lec/lab (# of hours):

Lab (# of hours): 33

Total course hours: 77

For each credit, the student will be expected to spend, on average, 3 hours per week in combination of in-class and out-of-class activity.

Course Title: General Chemistry**Course Description:**

A lab course discussing discussing states of matter, solutions, acids and bases, electrochemistry, nuclear chemistry, and spectrosopy. Topics involving organic chemistry and biochemistry are introduced.

Type of Course: Lower Division Collegiate

Is this class challengeable?

Yes

Can this course be repeated for credit in a degree?

No

Is general education certification being sought at this time?

Yes

Check which General Education requirement:

✓ Science & Computer Science

Is this course part of an AAS or related certificate of completion?

No

Are there prerequisites to this course?

Yes

Pre-reqs: Pass CH-222

Have you consulted with the appropriate chair if the pre-req is in another program?

No

Are there corequisites to this course?

No

Are there any requirements or recommendations for students taken this course?

No

Are there similar courses existing in other programs or disciplines at CCC?

No

Will this class use library resources?

Yes

Have you talked with a librarian regarding that impact?

No

Is there any other potential impact on another department?

No

Does this course belong on the Related Instruction list?

No

GRADING METHOD:

A-F or Pass/No Pass

Audit: Yes

When do you plan to offer this course?

✓ **Summer**✓ **Spring**

Is this course equivalent to another?

If yes, they must have the same description and outcomes.

No

Will this course appear in the college catalog?

Yes

Will this course appear in the schedule?

Yes**Student Learning Outcomes:**

Upon successful completion of this course, students should be able to:

1. correctly describe, explain, apply, illustrate, evaluate and perform qualitative and quantitative calculations based information given, derived, and/or and developed in a laboratory setting involving concepts, models, and theories;
 2. read actively, think critically and write purposely and capably about scientific concepts, theories, and problems based in chemistry;
 3. demonstrate the ability to communicate and comprehend basic scientific principles and concepts important to an understanding of major topics in general chemistry, (SC1)
 4. critically examine fundamentals of chemistry their role in shaping current scientific knowledge, (SC3)
 5. apply key concepts of general chemistry to solutions for everyday problems and generate further questions, (SC1)
 6. apply scientific and technical inquiry, individually, and collaboratively, to critically evaluate existing or alternative explanations and solve problems; (SC2)
 7. use electronic resources and common laboratory equipment in the pursuit of scientific inquiry, (SC2)
 8. demonstrate an ability to work individually and collaboratively to critically analyze scientific data, explore ideas and present complex scientific issues; (SC2)
 9. apply mathematics and technology to accurately interpret, validate and communicate solutions to solve scientific problems and test hypotheses; (SC1)
 10. critically examine the influence of scientific and technical knowledge on human society and the environment. (SC3)
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**AAOT/ASOT GENERAL EDUCATION OUTCOMES
COURSE OUTLINE MAPPING CHART**

Mark outcomes addressed by the course:

- Mark "C" if this course completely addresses the outcome. Students who successfully complete this course are likely to have attained this learning outcome.
- Mark "S" if this course substantially addresses the outcome. More than one course is required for the outcome to be completely addressed. Students who successfully complete all of the required courses are likely to have attained this learning outcome.
- Mark "P" if this course partially addresses the outcome. Students will have been exposed to the outcome as part of the class, but the class is not a primary means for attaining the outcome and assessment for general education purposes may not be necessary.

As a result of completing the AAOT/ASOT general education requirements, students will be able to:

WR: Writing Outcomes

- P** 1. Read actively, think critically, and write purposefully and capably for academic and, in some cases, professional audiences.
- P** 2. Locate, evaluate, and ethically utilize information to communicate effectively.
- P** 3. Demonstrate appropriate reasoning in response to complex issues.

SP: Speech/Oral Communication Outcomes

- P** 1. Engage in ethical communication processes that accomplish goals.
- P** 2. Respond to the needs of diverse audiences and contexts.
3. Build and manage relationships.

MA: Mathematics Outcomes:

- P** 1. Use appropriate mathematics to solve problems.
- P** 2. Recognize which mathematical concepts are applicable to a scenario, apply appropriate mathematics and technology in its analysis, and then accurately interpret, validate, and communicate the results.

AL: Arts and Letters Outcomes

1. Interpret and engage in the Arts & Letters, making use of the creative process to enrich the quality of life.
- P** 2. Critically analyze values and ethics within range of human experience and expression to engage more fully in local and global issues.

SS: Social Science Outcomes

1. Apply analytical skills to social phenomena in order to understand human behavior.
2. Apply knowledge and experience to foster personal growth and better appreciate the diverse social world in which we live.

SC: Science or Computer Science Outcomes

- S** 1. Gather, comprehend, and communicate scientific and technical information in order to explore ideas, models, and solutions and generate further questions.
- S** 2. Apply scientific and technical modes of inquiry, individually, and collaboratively, to critically examine the influence of scientific and technical knowledge on human society and the environment.

C

3. Assess the strengths and weaknesses of scientific studies and critically examine the influence of scientific and technical knowledge on human society and the environment.

CL: Cultural Literacy Outcome

1. Identify and analyze complex practices, values, and beliefs and the culturally and historically defined meanings of difference.

Outcomes Assessment Strategies:

:

Major Topic Outline:

1. Acid-base equilibria.
 - a. Acids and bases: review.
 - b. Bronsted-Lowery acids and bases.
 - c. Autoionization of water.
 - d. pH scale.
 - e. Strong acids and bases.
 - f. Weak acids.
 - g. Weak bases.
 - h. Relationship between K_a and K_b .
 - i. Acid-base properties of salt solutions.
 - j. Acid-base behavior and chemical structure.
 - k. Lewis acids and bases.
2. Additional aspects of aqueous equilibria.
 - a. Common-ion effect.
 - b. Buffered solutions.
 - c. Acid-base titrations.
 - d. Solubility equilibria.
 - e. Factors that affect solubility.
 - f. Precipitation and separation of ions.
 - g. Qualitative analysis for metallic elements.
3. Chemical thermodynamics.
 - a. Spontaneous processes.
 - b. Entropy and the second law of thermodynamics.
 - c. The molecular interpretation of entropy.
 - d. Entropy changes in chemical reactions.
 - e. Gibbs free energy.
 - f. Free energy and temperature.
 - g. Free energy and the equilibrium constant.
4. Electrochemistry.
 - a. Oxidation states and oxidation-reduction reactions.
 - b. Balancing oxidation-reduction equations.
 - c. Voltaic cells.
 - d. Cell EMF under standard conditions.
 - e. Free energy and redox reactions.
 - f. Cell EMF under nonstandard conditions.
 - g. Batteries and fuel cells.
 - h. Corrosion.

- i. Electrolysis.
- 5. Nuclear chemistry.
 - a. Radioactivity.
 - b. Patterns of nuclear stability.
 - c. Nuclear transmutations.
 - d. Rates of radioactive decay.
 - e. Detection of radioactivity.
 - f. Energy changes in nuclear reactions.
 - g. Nuclear power: fission.
 - h. Nuclear power: fusion.
 - i. Radiation in the environment and living systems.
- 6. Metals and metallurgy.
 - a. Occurrence and distribution of metals.
 - b. Pyrometallurgy.
 - c. Hydrometallurgy.
 - d. Electrometallurgy.
 - e. Metallic bonding.
 - f. Alloys.
 - g. Transition metals.
 - h. Chemistry of selected transition metals.
- 7. Organic and biological chemistry.
 - a. General characteristics of organic molecules.
 - b. Introduction to hydrocarbons.
 - c. Alkanes, alkenes, and alkynes.
 - d. Organic functional groups.
 - e. Chirality in organic chemistry.
 - f. Introduction to biochemistry.
 - g. Proteins.
 - h. Carbohydrates.
 - i. Lipids.
 - j. Nucleic acids.

Does the content of this class relate to job skills in any of the following areas:

- | | |
|--------------------------------------|-----------|
| 1. Increased energy efficiency | No |
| 2. Produce renewable energy | No |
| 3. Prevent environmental degradation | No |
| 4. Clean up natural environment | No |
| 5. Supports green services | No |

Percent of course: 0%

Section #2 Course Transferability

Concern over students taking many courses that do not have a high transfer value has led to increasing attention to the transferability of LDC courses. The state currently requires us to certify that at least one OUS school will accept a new LDC course in transfer. Faculty should communicate with colleagues at one or more OUS schools to ascertain how the course will transfer by answering these questions.

1. Is there an equivalent lower division course at the University?
2. Will a department accept the course for its major or minor requirements?
3. Will the course be accepted as part of the University's distribution requirements?

If a course transfers as an elective only, it may still be accepted or approved as an LDC course, depending on the nature of the course, though it will likely not be eligible for Gen Ed status.

Which OUS schools will the course transfer to? (Check all that apply)

Identify comparable course(s) at OUS school(s)

How does it transfer? (Check all that apply)

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Provide evidence of transferability: (minimum one, more preferred)

First term to be offered:

Next available term after approval

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