

# CHEM 101 College Chemistry I-CrsRvs-2019-11-06

- The workflow icon is no longer available. Please click on the Page Status after the orange circle icon near the page title. \*

Form Information

 The page you originally access is the global template version. To access the template document that progresses through the workflow, please complete the following steps:

**First Step:** ONLY change the bracketed text in the proposal name to match one of the following naming formats. You should remove the brackets as you do so.

- For a course revision proposal: **SWST 201 Sidewalk Construction and Planning-CrsRvs-2019-09-02**
- For a course deletion proposal, you may modify the page code: **SWST 217 Construction of Cobblestone Sidewalks-CrsDel-2019-09-02**
- For a course revision that includes a new request for distance education approval, you may modify the page code: **SWST 440 Computer-Aided Sidewalk Design-CR/DE-2019-09-02**

**Note - you generally do not need to request DE approval again if the course is already on the approved list: [CLICK HERE TO SEE ALL APPROVED DE COURSES](#)**

**Second Step:** Click "SAVE" on bottom right

- DO NOT TYPE ANYTHING INTO THE FIRST PAGE OTHER THAN THE TEXT IN BRACKETS***
- Please be sure to remove the Brackets while renaming the page***

**Third Step:** Make sure the word **DRAFT** is in yellow at the top of the proposal

**Fourth Step:** Click on "**EDIT CONTENTS**" (*not EDIT*) and start completing the template. When exiting or when done, click "**SAVE**" (*not Save Draft*) on bottom right

When ready to submit click on the **Page Status** link next to the orange circle icon and hit approve. It will then move to the chair as the next step in the workflow.

*\*Indicates a required field*

<b>Proposer*</b>	Sanda Maicaneanu	<b>Proposer Email*</b>	sanda.maicaneanu@iup.edu
<b>Contact Person*</b>	Sanda Maicaneanu	<b>Contact Email*</b>	sanda.maicaneanu@iup.edu
<b>Proposing Department/Unit*</b>	Chemistry	<b>Contact Phone*</b>	724-357-2277

<b>Course Level*</b>	undergraduate-level
----------------------	---------------------

## Course Revisions

(Check all that apply; fill out categories below as specified; i.e. if only changing a course title, only complete Category A)

Category A:	Category B:  course_revision liberal-studies  <i>* Teacher Education: Please complete the Teacher Education section of this form (below)</i> <i>* Liberal Studies: Please complete the Liberal Studies section of this form (below)</i> <i>* Distance Education: Please complete the Distance Education section of this form (below)</i>  <i>Check the <b>APPROVED DE Course List</b> - ON THE I-WIKI DOCUMENTS PAGE <u>before</u> completing the Distance Education (DE) section. If the course is already approved for Distance Education, you DO NOT need to do another DE proposal.</i>
-------------	--

## Rationale for Proposed Changes (All Categories)

<p><b>(A) Why is the course being revised/deleted:*</b></p> <p><i>Please be specific - this should be have more detail than the Summary for the Senate.</i></p>	<p>CHEM 101 College Chemistry I is being revised in order to align the course Student Learning Outcomes (SLOs) with the Expected Undergraduate Student Learning Outcomes (EUSLOs) that underpin the Liberal Studies program. The proposal also describes the methods by which the SLOs are assessed.</p>
<p><b>(B) University Senate Summary of Rationale*</b></p>	<p><i>Please enter a single paragraph summary/rationale of changes or proposal for University Senate.</i></p> <p>CHEM 101 College Chemistry I is being revised in order to align the course Student Learning Outcomes (SLOs) with the Expected Undergraduate Student Learning Outcomes (EUSLOs) that underpin the Liberal Studies program. The proposal also describes the methods by which the SLOs are assessed.</p>
<p><b>(C) Implications of the change on the program, other programs and the Students:*</b></p>	<p>The proposal has no implications for students, chemistry programs, or other programs.</p>

Current Course Information*	
<b>Category A</b>	
<b>(D) Current Prefix*</b>	CHEM
<b>Proposed Prefix</b>	
<b>(E) Current Number*</b>	101
<b>Proposed Number</b>	
<b>(F) Current Course Title*</b>	College Chemistry I
<b>Proposed Course Title</b>	
<b>(G) Current Prerequisite(s)</b>	none
<b>Proposed Prerequisite(s)</b>	<p><i>Note: if the current prerequisite is being dropped, you must state that clearly here: "Prerequisite is being changed to none." If it is being kept, you should repeat it here. <u>Please do not leave either prerequisite field blank.</u> If both the current and proposed prerequisites are 'none', please write 'none' in both boxes.</i></p>
<b>(H) Current Catalog Description</b>	<p>Basic principles and concepts of inorganic chemistry are developed using atomic and molecular structure with illustrative examples from descriptive chemistry. The laboratory portion of the course illustrates physical and chemical properties in a qualitative and quantitative manner. Designed for selected majors within the College of Health and Human Services and to fulfill the Liberal Studies Natural Science Laboratory Sequence requirement.</p>
<b>Proposed Catalog Description</b>	
<i>If changing Category A, no further action required.</i>	
<b>Category B (if no change, leave blank)</b>	
<p><b>(I) Repeatable Course</b></p> <p>This is only required for a course that can be repeated multiple times, such as an Independent Study or Internship. It does <u>not</u> refer to the D /F repeat process.</p>	<p>If YES, please complete the following:</p> <p>Number of Credits that May be Repeated:</p> <p>Maximum Number of Credits Allowed to be Repeated:</p>
<b>Proposed Repeatable Course</b>	<p>If YES, please complete the following:</p> <p>Number of Credits that May be Repeated:</p> <p>Maximum Number of Credits Allowed to be Repeated:</p>

<b>(J) Number of Credits</b>	Class Hours per week:3 Lab Hours:2 Credits:4												
<b>Proposed Number of Credits</b>	Class Hours:Lab Hours:Credits:												
<b>(K) Current Course Student Learning Outcomes (SLOs)</b>	1. Recognize the basic principles of matter and energy, as they apply to inorganic chemistry. 2. Analyze chemical processes in a quantitative manner. 3. Relate chemical principles to practical applications in areas such as safety science.												
<b>(L) Proposed Course Student Learning Outcomes (SLOs)</b>  For each outcome, describe how the outcome will be achieved	Note that the text box in the table expands <table border="1" data-bbox="500 541 1485 894"> <thead> <tr> <th data-bbox="500 541 589 621">SLO #</th> <th data-bbox="589 541 954 621">Outcome</th> <th data-bbox="954 541 1485 621">How outcome is assessed</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 621 589 711">1</td> <td data-bbox="589 621 954 711">Recognize the basic principles of matter and energy, as they apply to inorganic chemistry</td> <td data-bbox="954 621 1485 711">Homework assignments, quizzes, and exam questions will require students to identify and apply these principles.</td> </tr> <tr> <td data-bbox="500 711 589 802">2</td> <td data-bbox="589 711 954 802">Analyze chemical processes in a quantitative manner</td> <td data-bbox="954 711 1485 802">Homework assignments, quizzes, and exam questions will require students to perform calculations on specific chemical problems.</td> </tr> <tr> <td data-bbox="500 802 589 894">3</td> <td data-bbox="589 802 954 894">Relate chemical principles to practical applications in areas such as safety science</td> <td data-bbox="954 802 1485 894">Laboratory experiments and exam questions will evaluate how well students can connect theory with practice.</td> </tr> </tbody> </table>	SLO #	Outcome	How outcome is assessed	1	Recognize the basic principles of matter and energy, as they apply to inorganic chemistry	Homework assignments, quizzes, and exam questions will require students to identify and apply these principles.	2	Analyze chemical processes in a quantitative manner	Homework assignments, quizzes, and exam questions will require students to perform calculations on specific chemical problems.	3	Relate chemical principles to practical applications in areas such as safety science	Laboratory experiments and exam questions will evaluate how well students can connect theory with practice.
SLO #	Outcome	How outcome is assessed											
1	Recognize the basic principles of matter and energy, as they apply to inorganic chemistry	Homework assignments, quizzes, and exam questions will require students to identify and apply these principles.											
2	Analyze chemical processes in a quantitative manner	Homework assignments, quizzes, and exam questions will require students to perform calculations on specific chemical problems.											
3	Relate chemical principles to practical applications in areas such as safety science	Laboratory experiments and exam questions will evaluate how well students can connect theory with practice.											
<b>(M) Previous Brief Course Outline</b>  <i>(It is acceptable to copy from old syllabus)</i>	<i>As outlined by the federal definition of a "credit hour", the following should be a consideration regarding student work - For every one hour of classroom or direct faculty instruction, there should be a minimum of two hours of out of class student work.</i>  1. The Language of Chemistry <ul style="list-style-type: none"> <li>• Characteristics of elements, compounds, mixtures.</li> <li>• Scientific measurements: units, uncertainty, significant figures.</li> <li>• Scientific notation.</li> <li>• Using the unit-conversion (factor-unit, dimensional analysis) method to solve problems.</li> <li>• Concepts/measurements of mass, volume, density, temperature, heat, calorimetry.</li> <li>• Applications.</li> </ul> 2. Atomic Structure <ul style="list-style-type: none"> <li>• Dalton's atomic theory.</li> <li>• Laws of constant composition and conservation of mass.</li> <li>• Subatomic particles and atomic structure (the quantum mechanical atom).</li> <li>• Main group vs transition metals; metals vs nonmetals.</li> <li>• Electronic configuration, valence shells, and the Periodic Table.</li> <li>• The octet rule.</li> </ul> 3. Molecules and Chemical Bonds <ul style="list-style-type: none"> <li>• Ionic vs covalent bonding between atoms.</li> <li>• Octet rule and ion formation. Naming ionic and covalent compounds.</li> <li>• Lewis structures.</li> <li>• Molecular polarity.</li> <li>• VSEPR theory.</li> <li>• Practical applications.</li> </ul> 4. Chemical Calculations <ul style="list-style-type: none"> <li>• The mole and Avogadro's number.</li> <li>• Calculating formula mass.</li> <li>• Conversions between moles and grams.</li> <li>• Writing and balancing chemical equations.</li> <li>• Stoichiometry.</li> <li>• Practical applications.</li> </ul> 5. The Physical Properties of Gases												

- Units of pressure, volume, amount and temperature for gaseous behavior.
- Universal gas law.
- Quantitative descriptions of physical behavior.
- Solubilities of gases in liquids.
- Practical applications.

#### 6. Interactions Between Molecules

- The states of matter and transitions between them.
- Secondary forces and chemical structure/physical properties.
- Principles of solution formation.
- Dynamic equilibrium.
- Applications of equilibrium to everyday reactions.

#### 7. Solutions

- Molecular properties required for solution formation.
- Quantitative definitions of concentration.
- Methods of solution preparation/dilution.
- Diffusion.
- Osmotic pressure.
- Macromolecules and colloidal dispersions.
- Applications to cells, blood, parenteral solutions and other intra- and extra-cellular fluids.

#### 8. Chemical Reactions

- Factors that affect rate of reaction.
- Collision theory.
- Dynamic equilibria of chemical systems.
- Le Chatelier's Principle and qualitative/quantitative aspects of equilibrium.
- Applications.

#### 9. Bases and Buffers

- Acid base-chemistry and the ionization of water.
- pH.
- Strong vs weak acids and bases.
- Acid-base equilibria in solution.
- Bronsted-Lowry definitions.
- Buffers.
- Titration.
- Applications.

#### 10. Chemical and Biological Effects of Radiation

- Radioactivity and nuclear emissions.
- Nuclear equations.
- Radioactive decay and half-life calculations.
- Applications.

Laboratory topics - one laboratory period for each experiment

Week:

1. Check-in
2. Laboratory Safety
3. Chemical Calculations
4. Understanding Measurements
5. Density and Specific Gravity
- 6 Atomic Structure and Periodic Properties
7. Ions, Molecules, and a Reaction
8. The Gas Laws: Application to Molar Mass Determination
9. Physical and Chemical Changes: Thermochemistry
10. Solutions and Solubility
11. Titration
12. Dynamic Equilibrium

<p><b>(N) Brief Course Outline</b></p> <p><i>(Give sufficient detail to communicate the content to faculty across campus. It is not necessary to include specific readings, calendar or assignments)</i></p>	<p><i>As outlined by the federal definition of a "credit hour", the following should be a consideration regarding student work - For every one hour of classroom or direct faculty instruction, there should be a minimum of two hours of out of class student work.</i></p>
--	--

## Distance Education Section

*- Complete this section only if adding Distance Education to a New or Existing Course*

<b>If Completing this Section, Check the Box to the Right:</b>	<b>NOTE: you must check this box if the Course has previously been approved for Distance Education</b>
<b>Course Prefix/Number</b>	
<b>Course Title</b>	
<b>Type of Proposal</b>	<i>See CBA, Art. 42.D.1 for Definition</i>
<b>Brief Course Outline</b>	<p><i>Give an outline of sufficient detail to communicate the course content to faculty across campus. It is not necessary to include specific readings, calendar or assignments</i></p> <p><i>As outlined by the federal definition of a "credit hour", the following should be a consideration regarding student work - For every one hour of classroom or direct faculty instruction, there should be a minimum of two hours of out of class student work.</i></p>
<b>Rationale for Proposal (Required Questions from CBA)</b>	
<b>How is/are the instructor(s) qualified in the Distance Education delivery method as well as the discipline?</b>	
<b>For each outcome in the course, describe how the outcome will be achieved using Distance Education technologies.</b>	
<b>How will the instructor-student and student-student interaction take place? (if applicable)</b>	

How will student achievement be evaluated?	
How will academic honesty for tests and assignments be addressed?	

## Liberal Studies Section

- Complete this section only for a new Liberal Studies course or Liberal Studies course revision

<b>If Completing this Section, Check the Box to the Right:</b>	<b>NOTE: you must check this box if the Course/Program has previously been approved for Liberal Studies</b>
--	---

Liberal Studies Course Designations (Check all that apply)																					
Learning Skills:																					
Knowledge Area:	natural_science_laboratory																				
Liberal Studies Elective	<i>Please mark the designation(s) that apply - must meet at least one</i>																				
Expected Undergraduate Student	<p>Map each course outcome to the appropriate EUSLOs that apply. Fill in the course outcome number</p> <p>See <a href="https://www.iup.edu/liberal/faculty-and-staff/euslos/">https://www.iup.edu/liberal/faculty-and-staff/euslos/</a> for additional information regarding mapping EUSLOs</p>																				
<b>Learning Outcomes (EUSLOs)</b>  Map the Course Outcome to the EUSLO's	<table border="1"> <thead> <tr> <th>Informed Learners demonstrate:</th> <th>Course SLO #</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>the ways of modeling the natural, social and technical worlds</li> </ul> </td> <td>#1</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>The aesthetic facets of human experience</li> </ul> </td> <td></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>the past and present from historical, philosophical and social perspectives</li> </ul> </td> <td></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>the human imagination, expression and traditions of many cultures</li> </ul> </td> <td></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>the interrelationships within and across cultures &amp; global communities</li> </ul> </td> <td></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>the interrelationships within and across disciplines</li> </ul> </td> <td></td> </tr> <tr> <td> <table border="1"> <thead> <tr> <th>Empowered Learners demonstrate:</th> <th>Course SLO #</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>effective oral and written communication abilities</li> </ul> </td> <td></td> </tr> </tbody> </table> </td> <td></td> </tr> </tbody> </table>	Informed Learners demonstrate:	Course SLO #	<ul style="list-style-type: none"> <li>the ways of modeling the natural, social and technical worlds</li> </ul>	#1	<ul style="list-style-type: none"> <li>The aesthetic facets of human experience</li> </ul>		<ul style="list-style-type: none"> <li>the past and present from historical, philosophical and social perspectives</li> </ul>		<ul style="list-style-type: none"> <li>the human imagination, expression and traditions of many cultures</li> </ul>		<ul style="list-style-type: none"> <li>the interrelationships within and across cultures &amp; global communities</li> </ul>		<ul style="list-style-type: none"> <li>the interrelationships within and across disciplines</li> </ul>		<table border="1"> <thead> <tr> <th>Empowered Learners demonstrate:</th> <th>Course SLO #</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>effective oral and written communication abilities</li> </ul> </td> <td></td> </tr> </tbody> </table>	Empowered Learners demonstrate:	Course SLO #	<ul style="list-style-type: none"> <li>effective oral and written communication abilities</li> </ul>		
	Informed Learners demonstrate:	Course SLO #																			
	<ul style="list-style-type: none"> <li>the ways of modeling the natural, social and technical worlds</li> </ul>	#1																			
	<ul style="list-style-type: none"> <li>The aesthetic facets of human experience</li> </ul>																				
	<ul style="list-style-type: none"> <li>the past and present from historical, philosophical and social perspectives</li> </ul>																				
	<ul style="list-style-type: none"> <li>the human imagination, expression and traditions of many cultures</li> </ul>																				
	<ul style="list-style-type: none"> <li>the interrelationships within and across cultures &amp; global communities</li> </ul>																				
	<ul style="list-style-type: none"> <li>the interrelationships within and across disciplines</li> </ul>																				
	<table border="1"> <thead> <tr> <th>Empowered Learners demonstrate:</th> <th>Course SLO #</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>effective oral and written communication abilities</li> </ul> </td> <td></td> </tr> </tbody> </table>	Empowered Learners demonstrate:	Course SLO #	<ul style="list-style-type: none"> <li>effective oral and written communication abilities</li> </ul>																	
Empowered Learners demonstrate:	Course SLO #																				
<ul style="list-style-type: none"> <li>effective oral and written communication abilities</li> </ul>																					

	<ul style="list-style-type: none"> <li>ease with textual, visual and electronically-mediated literacies</li> </ul>	
	<ul style="list-style-type: none"> <li>problem solving skills using a variety of methods and tools</li> </ul>	#2
	<ul style="list-style-type: none"> <li>information literacy skills including the ability to access, evaluate, interpret and use information from a variety of sources</li> </ul>	
	<ul style="list-style-type: none"> <li>the ability to transform information into knowledge and knowledge into judgement and action</li> </ul>	
	<ul style="list-style-type: none"> <li>the ability to work within complex systems and with diverse groups</li> </ul>	
	<ul style="list-style-type: none"> <li>critical thinking skills including analysis, application and evaluation</li> </ul>	
	<ul style="list-style-type: none"> <li>reflective thinking and the ability to synthesize information and ideas</li> </ul>	
	<b>Responsible Learners demonstrate:</b>	<b>Course SLO #</b>
	<ul style="list-style-type: none"> <li>intellectual honesty</li> </ul>	#3
	<ul style="list-style-type: none"> <li>concern for social justice</li> </ul>	
	<ul style="list-style-type: none"> <li>civic engagement</li> </ul>	
	<ul style="list-style-type: none"> <li>an understanding of the ethical and behavioral consequences of decisions and actions on themselves, on society, and on the physical world</li> </ul>	
	<ul style="list-style-type: none"> <li>an understanding of themselves and a respect for the identities, histories and cultures of others</li> </ul>	

<p><b>How will each outcome be measured</b></p> <p><b>(note should mirror (L) Student Learning Outcomes* (SLO) from the course proposal</b></p>	<i>Narrative on how the course will address the Selected Category Content</i>	
	<b>Course SLO #</b>	<b>Assessment Tool to be used to measure the outcome</b>
	1	Homework, quizzes, and exam questions
	2	Homework, quizzes, and exam questions
	3	Lab reports and exam questions

**All Liberal Studies courses are required to include perspectives on cultures and have a supplemental reading.**

**Please answer the following questions.**


<p><b>Liberal Studies courses must include</b></p> <p><b>the perspectives and contributions</b></p> <p><b>of ethnic and racial minorities and</b></p> <p><b>of women whenever appropriate to</b></p> <p><b>the subject matter. Please explain</b></p> <p><b>how this course will meet this</b></p> <p><b>criterion.</b></p>	<p>Perspectives and contributions by women and ethnic minorities in chemistry are historic: Madam Curie's discovery of radiation, Markovnikov's Rule, the periodic table described by Mendeleev, the foundation of organic chemistry by Frederich Wohler, These landmark scientists and others are mentioned in the text and not overlooked by instructors.</p>
<p><b>Liberal Studies courses require the</b></p> <p><b>reading and use by students of at</b></p> <p><b>least one non-textbook work of</b></p> <p><b>fiction or non-fiction or a collection</b></p> <p><b>of related articles. Please describe</b></p> <p><b>how your course will meet this</b></p> <p><b>criterion.</b></p>	<p>The exception to non-textbook work is made by the quantitative nature of the course in both lecture (topics such as measurements, dimensional analysis, stoichiometry) and laboratory. Students are required to use calculators for complex algebraic problem-solving and for logarithmic functions (pH). Videos describing various chemical and biochemical principles and practical applications are included in the instructors' class material.</p>

## Teacher Education Section

*- Complete this section only for a new Teacher Education course or Teacher Education course revision*

<p><b>If Completing this Section,</b></p> <p><b>Check the Box to the Right:</b></p>	<p><b>NOTE: you must check this box if the Course/Program has previously been approved for Teacher Education related items</b></p>
<p><b>Course Designations:</b></p>	
<p><b>Key Assessments</b></p>	



	<p>For both new and revised courses, please attach (see the program education coordinator):</p> <ul style="list-style-type: none"> <li>• The Overall Program Assessment Matrix</li> <li>• The Key Assessment Guidelines</li> <li>• The Key Assessment Rubric</li> </ul> <p><b>File</b>   <b>Modified</b></p> <hr/> <p>No files shared here yet.</p> <ul style="list-style-type: none"> <li>• Drag and drop to upload or <a href="#">browse for files</a> </li> </ul>
<p><b>Narrative Description of the Required Content</b></p>	<p><i>How the proposal relates to the Education Major</i></p>

Please scroll to the top and click the Page Status if you are ready to take action on the workflow.  
Please submit an ihelp if you have any questions <http://ihelp.iup.edu>