

Program learning outcomes	Courses related to these learning outcomes	Assessment method	Measures/Criteria, Rubric	Data collection	Assessment cycle
BS Chemistry					
1. Demonstrate a foundational understanding of inorganic, physical and biochemistry and advanced knowledge in organic and analytical chemistry.	a. CHEM 4500: Inorganic b. CHEM 3300/3400: Physical 1&2 c. CHEM 3600: General Biochem d. CHEM 2430/2440: Organic 1&2 e. CHEM 2200/4200: Analytical 1&2	a. Total score on cumulative final exam b. Overall percentile on ACS exam in P. Chem 1 c. Total score on cumulative final exam d. Overall percentile on ACS exam in Orgo 2 e. Overall percentile on ACS exam in Analytical 1	a,c. 90% exceeds, 80-89 meets, 70-79 approaching, <70 does not meet b,d,e. 66th percentile exceeds, 45-66 meets, 33-44 approaching, <33 does not meet	Every offering	Year 1 of a 3-year cycle
2. Demonstrate proficiency of basic (general, physical, inorganic) and advanced (organic and analytical) laboratory techniques and conduct laboratory experiments safely.	a. CHEM 1115/1125: General 1&2 Lab b. CHEM 3330/3340: P. Chem 1&2 c. CHEM 3345: P. Chem Lab d. CHEM 2430/2440: Orgo 1&2 e. CHEM 2435/2445: Organic 1&2 Lab f. CHEM 2200: Analytical 1 g. CHEM 2205: Analytical 1 Lab h. CHEM 4505: Inorganic Lab	a. Score on Gen Chem 2 lab Boiling Point Elevation and score on safety exam in Gen Chem lab 1&2. b. Score on specific questions on ACS exam in P. Chem 1 c. Semester score in P. Chem lab d. Score on specific questions on ACS exam in Orgo 2 e. Technique points for Orgo 2 lab (Lab 7: E1/E2 Elimination) and score on safety exam in Orgo 1&2 f. Score on specific questions on ACS exam in Analytical 1 g. Semester score in Analytical 1 h. Score on ferrocene lab	a,e. For scores: 90% exceeds, 89 meets, 70-79 approaching, <70 does not meet. For safety exam: 80% or higher meets expectations, below 80% does not meet. b,d,f. If course % correct on each question meets or exceeds Diff Index provided by ACS, meets expectations. If below, does not meet. c,g,h. 90% exceeds, 80-89 meets, 70-79 approaching, <70 does not meet.	Every offering	a,c,e,g,h. Year 2 of a 3-year cycle b,d,f. Year 1 of a 3-year cycle
3. Collect, interpret, and analyze quantitative data.	a. CHEM 2430/2440: Orgo 1&2 b. CHEM 2200: Analytical 1 c. CHEM 2205/4205: Analytical 1&2 Lab d. CHEM 3330/3340: P. Chem 1&2 e. CHEM 4505: Inorganic Lab f. CHEM 3345: P Chem Lab	a. Score on specific questions on ACS exam in Orgo 2 b. Score on specific analytical questions on ACS exam on spectroscopy lab c. Semester score in Analytical 1 Lab and Spectroscopy lab in Analytical 2 d. Score on specific questions on ACS exam in Orgo 2 e. Semester score for P. Chem lab f. Overall score on for ferrocene lab	a. Score on specific questions on ACS exam in Orgo 2 b. Score on specific analytical questions on ACS exam on spectroscopy lab c. Semester score in Analytical 1 Lab and Spectroscopy lab in Analytical 2 d. Semester score for P. Chem lab e. Semester score for P. Chem lab f. Overall score on for ferrocene lab	Every offering	a-d,f. 90% exceeds, 80-89 meets, 70-79 approaching, <70 does not meet e. A score of 3 or 4 in each category meets, scores below 3 do not meet.
5. Design and conduct independent research	CHEM 3970: Undergrad research	Inquiry and Analysis VALUE rubric	A score of 3 or 4 in each category meets, scores below 3 do not meet.	Upon completion of undergrad thesis	Year 3 of 3-year cycle

	Mastery (3)	Meets Expectations (2)	Needs Development (1)	Score
Knowledge base	Has thorough knowledge of the background and motivation for project. Is familiar with relevant scientific literature.	Has a developing knowledge of the background and motivation for project. Has some familiarity with scientific literature.	Has an inadequate knowledge of the background and motivation for project. Has minimal familiarity with scientific literature.	
Technical skills	Is able to perform technical procedures and use instruments without assistance. Consistently reproduces high quality results.	Is able to perform technical procedures and use instruments with some assistance. Quality of results may be inconsistent.	Needs assistance performing technical procedures and using instruments. Consistently fails to reproduce results.	
Critical thinking and problem solving	Interprets data, draws reasonable conclusions, and proposes the next experiment. Solves problems and displays creativity.	Understands experimental methods and theoretical outcomes. Is not able to draw conclusions or propose the next experiment. Needs some help solving problems.	Does not engage in critical analysis of experimental results. Always requires help to solve problems.	
Integrity and collaboration	Works with peers and supervisors. Applies constructive criticism to improve performance. Respects different points of view. Helps in the mentoring or training of others.	Works with peers and supervisors in minimal conflicts. Sometimes applies constructive criticism to improve performance. Usually respects different points of view.	Does not plan experiments or manage time proficiently. Does not complete experiments in a timely manner.	
Terminology	Adheres to correct usage of chemical structures, formulas, equations and terminology.	Makes minor mistakes in the usage of chemical structures, formulas, equations and terminology.	Makes major mistakes in the usage of chemical structures, formulas, equations and terminology.	
Communication	Prepares oral and written presentations that are complete, well-written or delivered, and formatted and referenced appropriately.	Prepares oral and written presentations that are complete, well-written or delivered, and formatted and referenced appropriately.	Prepares oral and written presentations that are complete, well-written or delivered, and formatted and referenced appropriately.	

	Mastery (3)	Meets Expectations (2)	Needs Development (1)	Score
Arrangement of thesis	Information and text are arranged in a form that is typical of a publication in the field: Title, Introduction, Procedure, Results, Discussion, Conclusion, and References	Information and text are arranged in a format that is typical of a publication in the field with only one section out of order or not included.	Information and text are not arranged in a format that is typical of a publication in the field.	
Arrangement of text	Text is arranged in a coherent logical manner that is appropriate for the topic. Paragraphs are put together well with a coherent "flow". They are persuasive and connect to surrounding material.	Text is arranged in a logical manner appropriate for the topic. Paragraphs are put together well but some lack a coherent "flow". Some are persuasive and connect to surrounding material.	Text is not arranged in a logical manner. Paragraphs lack a coherent "flow". They are not persuasive and do not connect to the surrounding material.	
Title	The title clearly identifies the topic and the main point of the thesis	The title identifies the topic and gives a general idea of the main point.	The title does not identify the topic, or there is no title.	
Research Problem	The research problem meets the following criteria: is testable, is predictive, is specific, and looks at a particular question or theory.	The research problem meets all but one of the defined criteria.	The research problem does not meet two or more of the defined criteria.	
Introduction	Information relevant to the given topic is provided. The significance of the topic is clear to the reader	Information relevant to the given topic is provided, but the significance of the topic is not clear to the reader	Information provided is not relevant to the given topic. The significance of the topic is not clear to the reader	
Materials and methods	The procedure is written in paragraph form and can reliably be repeated by another			

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