Core Course Assessment Plan, 2018-19
Element 6: Natural Sciences

Please complete all sections; do not delete section information. Submit to Pilot when complete.

SECTION 1: GENERAL INFORMATION

Course Dept. Prefix: **CHM** Course #: **1020**

Semester when assessment will occur: ☐ Spring ☐ Summer ☒ **Fall** Year: **2018** or 2019

Course Title: **Elementary Organic Chemistry with Biochemical Applications**

Section Types and number of sections offered in 2018-19. Complete all that apply.

__X__ **Dayton face-to-face**	_____ Lake face-to-face
__X__ **Dayton online (hybrid)**	_____ Lake online
_____ Dayton Honors	_____ Lake Honors

Attributes: ____ Integrative Writing in Core
____ Multicultural Competency in Core
____ Service Learning in Core

Dept. Core Assessment Lead: **Audrey McGowin** (Name) **audrey.mcgowin@wright.edu** (email)

List at least two assessors; this may include course instructor only if there are multiple sections and multiple instructors of the course. Note - The instructor may not assess his/her students' papers.

- **Lary Sanders**
- **Michelle Newsome**
- **Basil Naah**
- _____

SECTION 2: ASSESSMENT PLAN

It is preferable to have the assessment plan for all sections of a course. If not feasible, please complete an assessment plan for separate sections.

Course Outcomes. __X__ Check here if Outcomes have been modified.

The course must address all 5 outcomes but must assess a minimum of 1 outcome. Highlight in yellow the outcome(s) you will assess. If you have modified the outcomes, please insert here in place of standard outcomes.

1. Understand the nature of scientific inquiry;
2. Critically apply knowledge of scientific theory and methods of inquiry to evaluate information from a variety of sources;
3. Distinguish between science and technology and recognize their roles in society;
4. Demonstrate an awareness of theoretical, practical, creative and cultural dimensions of scientific inquiry; and
5. **Evaluate fundamental theories underlying modern science.**

Assignments. Select **one** of the options below for assessment of one or more outcomes

☐ Written assignment(s) that addresses/address outcome(s). Include outcome #, title and description for each assignment.

Outcome #: _____ Title:

Description of assignment:

☐ Essay question(s). Provide the question(s) and outcome(s) below.

1. Outcome #: _____ Essay Question: _____
2. Outcome #: _____ Essay Question: _____
3. Outcome #: _____ Essay Question: _____

☐ Pilot asynchronous written discussion that addresses outcome(s). Provide the outcome # and question(s).

1. Outcome #: _____ Discussion Question: _____
2. Outcome #: _____ Discussion Question: _____
3. Outcome #: _____ Discussion Question: _____

☒ **Multiple Choice or T/F Marker questions** – 3 to 4 questions per outcome. List the outcome and question numbers. A rubric is not used for Marker questions. "All the above" should not be used as the correct answer more than once. **Courses that are IW or SRV/SRVI must use written assignments for those attributes**. Complete the benchmark: We expect **70**% of students to answer **50**% of the question(s) correctly.

1. Outcome #: **5**
   a) Question: Soaps or detergents form spherical structures called _____ that encapsulate grease and/or dirt allowing it to be cleansed.
      A. mordants **B. dimers** **C. triacylglycerols** **D. micelles** **E. fats**
   b) Question: What is the purpose of chromatography?
      A. differentiate materials based on solubility
      B. to run a reaction and monitor the time
      C. to separate a mixture of components
      D. catalyze specific reactions
      E. none of these
   c) Question: The increased boiling point of alcohols compared to alkanes and ethers of similar mass is due to:
      A. resonance. **D. hydrogen bonding.**
      B. dipole-dipole interactions. **E. ionic interactions.**
      C. a bent chain structure.
   d) Question: The oxygen atom in a carbonyl group is _____ the carbon atom.
      A. less electronegative than **D. more electropositive than**
      B. more electronegative than **E. more soluble than**
      C. identical in electronegativity to
2. Outcome #: _____
   a) Question: _____
   b) Question: _____
   c) Question: _____
   d) Question: _____

3. Outcome #: _____
    a) Question: _____
    b) Question: _____
    c) Question: _____
    d) Question: _____

Collecting and submitting the student assignment(s)

____ Will upload assignment(s) to Pilot _____ Will give access to assignment(s) on Pilot

Other: **will sent anonymized score information or data via email**

Rubric Selection (A, B). Select the items you feel best match your assignment(s) in the rubric(s) on the next pages. Please highlight in yellow. **If this course has an IW attribute, please also see section B.**

A. Element 6 Rubric. Select the item(s) you will use in your rubric by highlighting in yellow the item(s). You may select one or more of them. As there is overlap, **choose the items that best fit the assignment you select for assessment.** The items below are taken from the Association of American Colleges and Universities (AACU) Value Rubrics for Critical Thinking and Inquiry and Analysis.

IF YOU ARE USING MARKER QUESTIONS FOR THE OUTCOME, DO NOT USE THIS RUBRIC.

Item	Mastery 4	Partial Mastery 3	Progressing 2	Emerging 1
AACU Critical Thinking VALUE Rubric Items				
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context	Thoroughly	Identifies own and	Questions some	Shows an emerging

and assumptions	(systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	others' assumptions and several relevant contexts when presenting a position.	assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.
Item	**Mastery** 4	**Partial Mastery** **3**	**Progressing** **2**	**Emerging** **1**
AACU <u>Inquiry and Analysis</u> VALUE Rubric Items				
Topic selection	Identifies a creative, focused, and manageable topic that	Identifies a focused and manageable/ doable topic that appropriately	Identifies a topic that while manageable/ doable, is too narrowly	Identifies a topic that is far too general and wide-

	addresses potentially significant yet previously less-explored aspects of the topic.	addresses relevant aspects of the topic.	focused and leaves out relevant aspects of the topic.	ranging as to be manageable and doable.
Existing Knowledge, Research, and/or Views	Synthesizes in-depth information from relevant sources representing various points of view/ approaches.	Presents in-depth information from relevant sources representing various points of view/ approaches.	Presents information from relevant sources representing limited points of view/ approaches.	Presents information from irrelevant sources representing limited points of view/ approaches.
Design Process	All elements of the methodology or theoretical framework are skillfully developed. Appropriate methodology or theoretical frameworks may be synthesized from across disciplines or from relevant sub disciplines.	Critical elements of the methodology or theoretical framework are appropriately developed, however, more subtle elements are ignored or unaccounted for.	Critical elements of the methodology or theoretical framework are missing, incorrectly developed, or unfocused.	Inquiry design demonstrates a misunderstanding of the methodology or theoretical framework.
Analysis	Organizes and synthesizes evidence to reveal insightful patterns, differences, or similarities related to focus.	Organizes evidence to reveal important patterns, differences, or similarities related to focus.	Organizes evidence, but the organization is not effective in revealing important patterns, differences, or similarities.	Lists evidence, but it is not organized and/ or is unrelated to focus.
Conclusions	States a conclusion that is a logical extrapolation from the inquiry findings.	States a conclusion focused solely on the inquiry findings. The conclusion arises specifically from and responds specifically to the inquiry findings.	States a general conclusion that, because it is so general, also applies beyond the scope of the inquiry findings.	States an ambiguous, illogical, or unsupportable conclusion from inquiry findings.
Limitations and Implications	Insightfully discusses in detail relevant and supported limitations and implications.	Discusses relevant and supported limitations and implications.	Presents relevant and supported limitations and implications.	Presents limitations and implications, but they are possibly irrelevant and unsupported.

B. If this is an IW course, you will use the items on this page. You may select one or more of them. Please highlight in yellow.

Item	Mastery 4	Partial Mastery 3	Progressing 2	Emerging 1
Includes considerations of audience, purpose, and the circumstances surrounding the writing task(s).	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Formal and informal rules inherent in the expectations for writing in particular forms and/or academic fields (please see glossary).	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices	Demonstrates consistent use of important conventions particular to a specific discipline and/or writing task(s), including organization, content, presentation, and stylistic choices	Follows expectations appropriate to a specific discipline and/or writing task(s) for basic organization, content, and presentation	Attempts to use a consistent system for basic organization and presentation.
Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.

SECTION 3: UCRC COMMITTEE REVIEW ONLY. DO NOT delete this section.

Item	Complete / NA / Revision Requested	Comments
Learning Outcomes for Element 6 Natural Science	**Complete**	
Assignments matched to Element 6 LOs	**Revision Requested**	**The committee changed "discuss" to "evaluate" (learning outcome 5) to match what is being measured.** **Please provide the answer options to the multiple choice questions.**
Rubric for LOs	**N/A**	
Rubric for IW Attribute	**N/A**	
Assigned Approved Reviewers	**Complete**	

Committee Review Completed ☐

Committee Chair Signature ____ Dr. Anne M. Bowling _____ Date __December 2018_____

Note: Report Template will be added to each of the individualized assessment plans to facilitate having one final document (assessment and report) for each course.

SECTION 4: ASSESSMENT REPORT DUE May 7, 2021

A separate report needs to be submitted for each assessment plan approved by the Undergraduate Core Oversight Committee (UCOC).

Please upload this entire document to the Pilot course called Element 5 Core Course Assessment 2020-21 (continuous year) by Friday, May 7, 2021. The Final Report Dropbox link can be accessed via Content > Dropbox (Plans, Reports) > Final Report Dropbox.

Date Report Submitted: 5/6/2021

Element: Core Element 6 – Natural Science

Academic Year: 2018 to 2021

Course and Sections Assessed: CHM 1020-01 sections from Fall 2018, Fall 2019, Spring 2020, Summer 2020, Fall 2020, and Spring 2021

Describe the final assessment plan that was implemented and explain any changes made to the approved plan.

I. Core Learning Outcomes Assessed (list):

5. Evaluate fundamental theories underlying modern science.

II. Procedures Used for Assessment

For **each** learning outcome addressed by this report, state where and when data were collected (in a course, exam, or performance) and how they were evaluated (e.g. rubric, rating scale, key questions from exams, etc.). Specify the course or courses where students demonstrated the outcomes (if applicable) and the assignment(s) that you used for assessment purposes (e.g., capstone project, final examination, research paper, student presentation, performance, portfolio, etc.).

The final assessment was largely implemented as described in the initial assessment plan across six different semesters since Fall 2018. The inventory of questions asked to the class occurred across two or three different assignments, so the data had to be complied for each student. The tabulated results for each individual were then analyzed as to whether the benchmarks were satisfied.

In recent semesters as teaching/learning has gone remote, the assessments have been conducted through Pilot as opposed to using paper and Scantron. Through the 2019 semesters, the data was collected across three separate assessments (Lab Exam #1, Lab Exam #2, and the Comprehensive Final Exam) which were all multiple choice in nature and utilized Scantrons. Since 2020, the assessments have been conducted via two examinations through Pilot (Lab Exam and Comprehensive Final Exam) and the student data exported from Pilot and complied. The only major deviations that were noted from the approved assessment plan is this implementation procedure.

III. Summary of Assessment Results:

What did you find from your assessments? (Present and analyze the results from the Aqua system analysis by Vice Provost Tammy Kahrig and/or your departmental review of marker questions.) What did your data reveal about how well students are achieving the Core Learning Outcomes that you listed above? After

analyzing your data, present a summary of the data, clearly indicating what any numbers represent (e.g. percentages? means? medians?). Please number each corresponding assessment, summary, and analysis.

Benchmark Met ■ Yes or ☐ No

If not met, please identify conditions (if any) that may have impacted these findings.

Fall 2018 - A total of 89 students in CHM 1020 Fall 2018 completed the full set of assessment questions. Those that did not complete the assessment were not included in the data set. In the provided results, randomized student data has been provided showing responses corresponding to the questions (a, b, c, and d) provided on the assessment plan. The stated benchmark provided in the approved assessment plan was: *70% of students to answer 50% of the questions correctly*. The assessment data collected shows that 75 out of the 89 students who completed the assessment achieved at least 50%. This corresponds to 84% of the students. The benchmark was achieved.

Fall 2019 - A total of 67 students in CHM 1020 Fall 2019 completed the full set of assessment questions. Those that did not complete the assessment were not included in the data set. In the provided results, randomized student data has been provided showing responses corresponding to the questions (a, b, c, and d) provided on the assessment plan. The stated benchmark provided in the approved assessment plan was: *70% of students to answer 50% of the questions correctly*. The assessment data collected shows that 62 out of the 67 students who completed the assessment achieved at least 50%. This corresponds to 93% of the students. The benchmark was achieved.

Spring 2020 - A total of 98 students in CHM 1020 Spring 2020 completed the full set of assessment questions. Those that did not complete the assessment were not included in the data set. In the provided results, randomized student data has been provided showing responses corresponding to the questions (a, b, c, and d) provided on the assessment plan. The stated benchmark provided in the approved assessment plan was: *70% of students to answer 50% of the questions correctly*. The assessment data collected shows that 97 out of the 98 students who completed the assessment achieved at least 50%. This corresponds to 99% of the students. The benchmark was achieved.

Summer 2020 - A total of 20 students in CHM 1020 Summer 2020 completed the full set of assessment questions. Those that did not complete the assessment were not included in the data set. In the provided results, randomized student data has been provided showing responses corresponding to the questions (a, b, c, and d) provided on the assessment plan. The stated benchmark provided in the approved assessment plan was: *70% of students to answer 50% of the questions correctly*. The assessment data collected shows that 19 out of the 20 students who completed the assessment achieved at least 50%. This corresponds to 95% of the students. The benchmark was achieved.

Fall 2020 - A total of 95 students in CHM 1020 Fall 2020 completed the full set of assessment questions. Those that did not complete the assessment were not included in the data set. In the provided results, randomized student data has been provided showing responses corresponding to the questions (a, b, c, and d) provided on the assessment plan. The stated benchmark provided in the approved assessment plan was: *70% of students to answer 50% of the questions correctly*. The assessment data collected shows that 93 out of the 95 students who completed the assessment achieved at least 50%. This corresponds to 98% of the students. The benchmark was achieved.

Spring 2021 - A total of 70 students in CHM 1020 Spring 2021 completed the full set of assessment questions. Those that did not complete the assessment were not included in the data set. In the provided results, randomized student data has been provided showing responses corresponding to the questions (a, b, c, and d) provided on the assessment plan. The stated benchmark provided in the approved assessment plan was: *70% of students to answer 50% of the questions correctly*. The assessment data collected shows that 67 out of the 70 students who completed the assessment achieved at least 50%. This corresponds to 96% of the students. The benchmark was achieved.

Table 1: Summary of CHM 1020 Assessment Data from Fall 2018 to Spring 2021

Semester	Number of Students Assessed	Number of Students Met Benchmark	Percentage
Fall 2018	89	75	84%
Fall 2019	67	62	93%
Spring 2020	98	97	99%
Summer 2020	20	19	95%
Fall 2020	95	93	98%
Spring 2021	70	67	96%
OVERALL	**439**	**413**	**94%**

Across all the semesters in which data was collected, the stated benchmarks were clearly met. Students seems to be meeting the Core Learning Outcomes according to their performance on the selected assessment questions.

IV. ACTIONS TAKEN/PLANNED TO IMPROVE STUDENT LEARNING

Describe how you shared the results with instructors of the courses, the department curriculum committee and chair, Lake campus, and other stakeholders. Explain briefly how department faculty will make improvements based upon the assessment findings (e.g. plans to gather more information; recommending changes to the learning outcomes or assessment procedures; changes in course content, instructional approaches, technology, order of course offerings, materials, resources, assignments, policies, funding, advising, planning, training for adjuncts, etc.).

The randomized student data and assessor analysis were shared with the department chair and relevant faculty via email. Based on the positive results of the initial assessment, no changes were immediately recommended for the course or the assessment plan. However, the assessment of additional learning outcomes will be discussed for future semesters. Once all the assessments for all the core chemistry courses have been complied. The results will be immediately shared via email with the head of the chemistry undergraduate studies committee.

V. Assessment Administration Feedback

The assessment of the courses was part of the Core assessment cycle. The assessment plan was reviewed and approved by the UCOC. The UCOC provided a presentation on tools available to assist with the assessment, including Watermark Aqua.

Please describe any changes you recommend about the oversight of the assessment process by the UCOC and the Academic Affairs office.

No changes are recommended at this time.

UCOC Report Review

Item	Complete/NA	Revision Requested	Comments
Identified Outcome Assessed	**XX**		
Identified Procedure for Assessment	**XX**		
Summary of Results	**XX**		
Results Shared with Instructor, Dept Curriculum Committee, etc.	**XX**		
Plan for Improvements	**XX**		

Committee Review Completed XXX

Committee Chair Signature ___ Dr. Ann M. Bowling _____ Date __December 2021_____