Degree Program Student Learning Report

Department of Mathematics & Physical Sciences

BS in Chemical Engineering

PART 1
Degree Program Mission and Student Learning Outcomes

A. State the school, department, and degree program missions.

University Mission	College Mission	Department Mission	Degree Program Mission
Our mission is to ensure students develop the skills and knowledge required to achieve professional and personal goals in dynamic local and global communities.	Central to the mission of the College is the preparation of students to achieve professional and personal goals in their respective disciplines and to enable their success in dynamic local and global communities. Our strategy is to foster an academic setting of diverse curricula that inherently incorporates an environment of service and collegiality.	The mission of the Department of Mathematics and Physical Sciences at Rogers State University is to support students in their pursuit of knowledge in mathematics and physical science.	The degree in Chemical Engineering is a distinctive and rigorous program of study designed to provide students with academically strong and diverse core courses with a reasonable number of emphasis courses and electives. The program will prepare students for immediate employment in the private STEM sector, in research and product development in Oklahoma's traditional petrochemical industry, and emerging industries in biomedical engineering, nanotechnology, and fuel cells.

B. Align school purposes, department purposes, and program student learning outcomes with their appropriate University commitments.

University Commitments	College Purposes	Department Purposes	Student Learning Outcomes
To provide quality associate, baccalaureate, and graduate degree opportunities and educational experiences which foster student excellence in oral and written communications, scientific reasoning and critical and creative thinking.	To offer innovative degrees, which focus upon developing skills in oral and written communication, critical thinking, creativity, empirical and evidenced-based inquiry, experimental investigation and theoretical explanation of natural phenomena, and innovative technology.	1. To increase the student's critical thinking and reasoning abilities. 2. To increase the student's understanding and appreciation of the physical world, and the ability to apply this understanding in his/her personal and professional life. 3. To increase the student's awareness of the benefits of incorporation of technology into Science and Math studies. 4. To increase the student's ability to interpret and understand his/her world mathematically.	1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 3. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. 4. An ability to function effectively on a team whose members

University Commitments	College Purposes	Department Purposes	Student Learning Outcomes
			together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. 5. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. 6. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
To promote an atmosphere of academic and intellectual freedom and respect for diverse expression in an environment of physical safety that is supportive of teaching and learning.	To educate its majors to think independently and have the knowledge, skills and vision to work in all types of situations and careers and communicate with all types of people.		
To provide a general liberal arts education that supports specialized academic programs and prepares students for lifelong learning and service in a diverse society.	To offer general education courses of high quality and purpose that provide a foundation for life- long learning.	5. To prepare a student to matriculate into a four-year degree program in math or science-related fields or graduate.	

University Commitments	College Purposes	Department Purposes	Student Learning Outcomes
To provide students with a diverse, innovative faculty dedicated to excellence in teaching, scholarly pursuits and continuous improvement of programs.	To foster a community of scholars among the faculty and students of the institution.		
To provide university-wide student services, activities and resources that complement academic programs.			
To support and strengthen student, faculty and administrative structures that promote shared governance of the institution.			
To promote and encourage student, faculty, staff and community interaction in a positive academic climate that creates opportunities for cultural, intellectual and personal enrichment for the University and the communities it serves.	To offer and promote artistic, scientific, cultural, and public affairs events on the campus and in the region.	6. To serve as a resource for the community, utilizing the expertise of the faculty.	

PART 2

Revisit Proposed Changes Made in Previous Assessment Cycle

Revisit each instructional/assessment change proposed in Part 5 of the degree program SLR for the preceding year. Indicate whether the proposed change was implemented and comment accordingly. Any changes the department implemented for this academic year, but which were not specifically proposed in the preceding report, should also be reported and discussed here. Please note if no changes were either proposed or implemented for this academic year.

Proposed Change	Implemented? (Y/N)	Comments
This is the initial assessment of this degree program with the available relevant data for SOLs 1 and 5. The remaining SOLs will be assessed next year when the data from the new courses becomes available.	N/A	N/A

PART 3

Response to University Assessment Committee Peer Review

The University Assessment Committee provides written feedback on departmental assessment plans through a regular peer review process.

This faculty-led oversight is integral to RSU's commitment to the continuous improvement of student learning and institutional effectiveness. UAC recommendations are not compulsory and departments may implement them at their discretion. Nevertheless, respond below to each UAC recommendations from last year's peer review report. Indicate whether the recommendation was implemented and comment accordingly. Please indicate either if the UAC had no recommendations or if the program was not subject to review in the previous cycle.

Peer Review Feedback	Implemented (Y/N)	Comment
No pear-review report was provided.		

PART 4
Evidence of Student Learning

Evidence and analyze student progress for each of the student learning outcomes (same as listed in Part I B above) for the degree program. See the *Appendix* for a detailed description of each component. Note: The table below is for the first program learning outcome. Copy the table and insert it below for each additional outcome. SLO numbers should be updated accordingly.

A. Student Learning Outcome					
SLO #1 Demonstrate the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (ABET Criterion-1)					
B. Assessment Measure	**C. Performance Standard**	**D. Sampling Method**	**E. Sample Size (n)**	**F. Results**	**G. Standard Met (Y/N)**
1A. **Direct Measure:** The combined total of assignments, quizzes, and hourly exam scores in MATH 1715, Pre-calculus.	1A. At least 70% of majors will achieve a combined score of 70% or higher on assignments, quizzes, and hourly exams, and will pass the course with a semester total of minimum 70%.	1A. All CHE Major Students taking MAHT 1715, Pre-Calculus.	3	1A. 67% (2 out of 3) majors met the expected threshold standard. The target goal was 70%, indicating that while most students succeeded, there is a slight shortfall.	1A. N (2023-24)
1B. **Direct Measure:** Chapter exams in MATH 2264, Calculus.	1B. At least 70% of majors will earn a grade of 70% or better on four hourly Exams.	1B. All CHE Major Students taking MATH 2264, Calculus	5	1B. 80% (4/5) of CHE major students met the expected performance standard.	1B. Y (2023-24)

A. Student Learning Outcome					
SLO #1 Demonstrate the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (ABET Criterion-1)					
B. Assessment Measure	**C. Performance Standard**	**D. Sampling Method**	**E. Sample Size (n)**	**F. Results**	**G. Standard Met (Y/N)**
1C. Direct Measure Chapter exams in CHEM 1315	1C. At least 70% of majors will earn a grade of 70% or better on four hourly Exams.	1C. All CHE Major Students taking CHEM 1315, General Chemistry I.	7	1C. 100% (7/7) of CHE major students met the expected performance standard.	1C. Y (2023-24)

H. Conclusions
13 out of 15 CHE majors met the expected performance outcomes: 80% (4 out of 5) in MATH 2264 and 100% (7 out of 7) in CHEM 1315. However, there was a slight shortfall in MATH 1715, with 67% (2 out of 3) meeting the standard.

A. Student Learning Outcome					
SLO # 5: Demonstrate the ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (ABET Criterion-6)					
B. Assessment Measure	**C. Performance Standard**	**D. Sampling Method**	**E. Sample Size (n)**	**F. Results**	**G. Standard Met (Y/N)**
5A. Performance in Lab section of the course in CHEM 1315, General Chemistry I.	5A. 80% of all CHE major students will perform at 80% level or higher on the average of all General chemistry I	5A. All CHE Major Students taking CHEM 1315, General Chemistry I	7	5A. 100% (7/7) CHE majors met the expected performance standard.	Y (2023-24)
H. Conclusions					
All CHE major students met the 80% threshold standard, indicating their capability in conducting suitable experiments, as well as analyzing and interpreting data effectively.					

PART 5
Proposed Instructional or Assessment Changes

Learning outcomes assessment can generate actionable evidence of student performance that can be used to improve student success and institutional effectiveness. Knowledge of student strengths and weakness gained through assessment can inform faculty efforts to improve course instruction and program curriculum. Below discuss potential changes the department is considering which are aimed at improving student learning or the assessment process. Indicate which student learning outcome(s) will be affected and provide a rationale for each proposed change. These proposals will be revisited in next assessment cycle.

Proposed Change	Applicable Learning Outcomes	Rationale and Impact
This is the initial assessment of this degree program with the available relevant data for SOLs 1 and 5. The remaining SOLs will be assessed next year when the data from the new courses becomes available.		

PART 6
Summary of Assessment Measures

A. How many different assessment measures were used?
Four different assessment measures were used.

B. List the direct measures (see appendix):
Four direct measures:

MATH 1715: Assignments, quizzes and hourly exam scores in Pre-Calculus
MATH 2264: Exam scores in Calculus
CHEM 1315: Exam Scores in General Chemistry I
CHEM 1315: Scores in lab section of General Chemistry I

C. List the indirect measures (see appendix):
No indirect measures were used.

PART 7
Faculty Participation and Signatures

A. Provide the names and signatures of all full time and adjunct faculty who contributed to this report.

Faculty Name	Assessment Role	Signature
Dr. Min Soe	Prepared the report, collected and analyzed the data.	Min Soe
Dr. Ram Adhikari	Collected data & reviewed report.	
Dr. Sukhitha Vidurupola	Reviewed report.	Sukhitha Vidurupola
Dr. Kasia Roberts	Collected data & reviewed report.	Kasia Roberts
Dr. Kirk Voska	Reviewed report	Dr. Kirk Voska

B. Reviewed by:

Titles	Name	Signature	Date
Department Head	Dr. Jin Seo		5/22/24
Dean	Dr. Susan Willis		5-23-24

Appendix

Student Learning Outcome

Student learning outcomes are the observable or measurable results that are expected of a student following a learning experience. Learning outcomes may address knowledge, skills, attitudes, or values that provide evidence that learning has occurred. They can apply to a specific course, a program of study, or an institution. Outcomes should be worded in language that clearly implies a measurable behavior or quality of student work. Outcomes should also include Bloom's action verbs appropriate to the skill level of learning expected of students.

Examples:

Students will be able to apply principles of evidence-based medicine to determine clinical diagnoses and implement acceptable treatment modalities.

Students will be able to articulate cultural and socioeconomic differences and the significance of these differences for instructional planning.

Assessment Measure

An assessment measure is a tool or instrument used to gather evidence of student progress toward an established learning outcome. Every program learning outcome should have at least one appropriate assessment measure. Learning outcomes are frequently complex, however, and may require multiple measures to accurately assess student performance. Assessment plans should try to incorporate a combination of direct and indirect assessment measures. Direct provide concrete evidence of whether a student has command of a specific subject or content area, can perform a certain task, exhibits a particular skill, demonstrates a certain quality in their work, or holds a particular value. Because direct measures tap into actual student learning, it is often viewed as the preferred measure type. Indirect measures assess opinions or thoughts about the extent of a student's knowledge, skills, or attitudes. They reveal characteristics associated with learning, but they only imply that learning has occurred. Both types of measures can provide useful insight into student learning and experiences in a program. Each also has unique advantages and disadvantages in terms of the type of data and information it can provide. Examples of common direct and indirect measures are listed below.

Direct Measures

- Comprehensive exams
- Class assignments
- Juried review of performances and exhibitions
- Internship or clinical evaluations
- Portfolio evaluation
- Pre/post exams
- Third-party exams such as field tests, certification exams, or licensure exams
- Senior thesis or capstone projects

Indirect Measures

- Graduate exit interviews
- Focus group responses
- Job placement statistics
- Graduate school placement statistics
- Graduation and retention rates
- Student and alumni surveys that assess perceptions of the program
- Employer surveys that assess perceptions of graduates
- Honors and awards earned by students and alumni.

Performance Standard

A performance standard is a clearly-defined benchmark that establishes the minimally-acceptable level of performance expected of students for a particular measure.

Examples:

At least 70% of students will score 70% or higher on a comprehensive final exam.

At least 75% of students will earn score a "Proficient" or higher rating on the Communicate Effectively rubric.

Sampling Method

Sampling method describes the methodology used for selecting the students that were assessed for a given measure. In some cases, such as most course-embedded measures, it is possible to assess all active enrolled students. In other cases, however, it is not feasible to measure the population of all potential students. In these cases, it is important that a well-designed sampling

scheme be used to ensure the sample of students measured is an unbiased representation of the overall population. Where multiple instructors teach a particular course, care should be taken to assess students across all instructors, including adjuncts.

Examples:
All students enrolled in BIOL 4801 Biology Research Methods II
All majors graduating in the 2016-17 academic year.

Sample Size
Sample size is the number of students from which evidence of student learning was obtained for a given assessment measure.

Results
Results are an analytical summary of the findings arising from the assessment of student performance for a particular assessment measure. Typical presentation includes descriptive statistics (mean, median, range) and score frequency distributions.

Standard Met?
This is a simple yes/no response that indicates whether the observed level of student performance for a particular measure meets or exceeds the established standard. An N/A may be used where circumstances prevented the department from accurately assessing a measure.

Conclusion
The conclusion is a reflective summary and determination of the assessment results obtained for a specific learning outcome. Questions to consider in this section include the following:

- Does the assessment evidence indicate the learning outcome is being satisfactorily met?
- Where multiple measures are used for a single outcome, do the results present a consistent or contradictory pattern?
- What are the most valuable insights gained from the assessment results?
- What strengths and weaknesses in student learning do the results indicate?
- What implications are there for enhancing teaching and learning?
- How can the assessment process be improved?