Assessment Update for Ralph E. Martin Department of Chemical Engineering Graduate Program: Summer 2022 – Spring 2023

June 28, 2023

Ralph E. Martin Department of Chemical Engineering
University of Arkansas
3202 Bell Engineering Center
Fayetteville, AR 72701
Phone: (479)-575-4951
Fax: (479)-575-7926
http://chemical-engineering.uark.edu/

Program Goals

The **program goal**, or **educational objective,** of the Chemical Engineering graduate program is to prepare students for advanced roles in the profession through a combination of planned coursework and research activities so that graduates are equipped to address present and future challenges in such areas as research, teaching, management, and commercialization.

This revised educational objective (program goal) was adopted by the faculty of the Department at its January 13, 2015 faculty meeting. A change in the last word from entrepreneurship to commercialization was adopted by the Faculty during the May 5, 2022 faculty meeting.

The graduate program objective and outcomes are listed on the Departmental website at http://chemical-engineering.uark.edu/academics/graduate-program/index.php.

Student Learning Outcomes

The educational outcomes of our graduate program are to assure that each student has had an opportunity to:

1. Critically analyze meaningful and technologically relevant data, and for thesis students, plan and safely conduct research;
2. Demonstrate proficiency in fundamental mathematics and chemical engineering problem solving;
3. Understand professional and ethical responsibility; and
4. Develop and use effective written and oral communication skills.

The College of Engineering requested that each department develop learning outcomes to support their program goals in 2015. These learning outcomes were adopted by the faculty of the Department at its Fall 2015 retreat, held on August 17, 2015. The graduate program student outcomes are listed on the Departmental website at http://chemical-engineering.uark.edu/academics/graduate-program/index.php.

Process for Assessing Student Learning Outcomes

The methods for assessing the student outcomes were also adopted by the faculty at the 2015 Fall Retreat (on August 17, 2015). A summary of the assessment process is shown in Table 1. Instead of using individual graduate classes in outcome assessment, the Department elected to use selected questions in the exit interview process, student GPA, performance on safety quizzes, and performance during the candidacy exam and thesis/dissertation defense. The suitability of these assessment tools is summarized below.

Table. 1 Assessment of Graduate Student Learning Outcomes

Learning Outcome	Assessment Tools
1. Critically analyze meaningful and technologically relevant data, and for thesis students, plan and safely conduct research	Student performance on: • the candidacy exam (consisting of the student's presentation of the research proposal to the graduate committee);

	• thesis/dissertation defense or comprehensive exam (for the MS non-thesis option only); • annual safety quizzes (average score)
2. Demonstrate proficiency in fundamental mathematics and chemical engineering problem solving	Student performance on: • the candidacy exam (consisting of the student's presentation of the research proposal to the graduate committee); • thesis/dissertation defense or comprehensive exam (for the MS non-thesis option only); • graduate coursework (through GPA)
3. Understand professional and ethical responsibility	Student responses on: • Graduate exit interview questions
4. Develop and use effective written and oral communication skills	Student performance on: • the candidacy exam (consisting of the student's presentation of the research proposal to the graduate committee); • thesis/dissertation defense or comprehensive exam (for the MS non-thesis option only) Student responses on: • Graduate exit interview questions

1. Student Performance on Candidacy Exams and the Thesis/Dissertation Defense

Student candidacy exams (consisting of the student's presentation of the research proposal to the graduate committee) and the thesis/dissertation defense (or comprehensive exam for the MS non-thesis option only) are excellent opportunities to observe and evaluate individual students in professional settings. During the candidacy exam, the student is required to present an overview of the research topic, as well as a clear and concise plan for executing the planned research. Similarly, during the thesis/dissertation defense (or comprehensive exam for the non-thesis MS option), the student summarizes their findings and explains and defends in detail the meaning and significance of the work. Thus, this is an excellent time for the student to illustrate competence in three of the four learning outcomes:

- Outcome 1. The ability to critically analyze meaningful and technologically relevant data, and for thesis students, plan and safely conduct research
- Outcome 2. A demonstration of proficiency in fundamental mathematics and chemical engineering problem solving
- Outcome 4. A demonstration of ability to develop and use effective written and oral communication skills

To facilitate the evaluation process, a form is provided to each committee member to evaluate the student on each outcome during the candidacy exam, thesis/dissertation defense or comprehensive exam. In addition, space is provided on the form for comments on performance.

Lastly, additions to the form were incorporated to indicate the number of manuscripts and presentations that the student performed at the time of the examination.

2. Performance on Annual Safety Quizzes

Safety is a very important part of any chemical engineering student's training, but it is even more important when it is realized that students have greater laboratory access and increased laboratory responsibility during their graduate training. Safety practices are taught as part of the CHEG Graduate Seminar Course. The required yearly training and testing cover general safety issues including Hazard Awareness and Chemical Safety, the new Global Harmonization Standard (GHS) by OSHA, Safety Data Sheets (SDS), Chemical and Biological Waste Disposal, Emergency Preparedness, Accident Prevention, and Chemical Spill Response. These lectures, videos, corresponding tests, and additional training modules are accessed on the CHEG Safety Training Blackboard Site. Additional training modules and corresponding tests are available for chemical sensitizers, chemical peroxide formers, nanoparticle basics and safety, chemical storage, autoclaves, green chemistry and engineering, and introduction to laser safety, which are required for students working in these more specialized areas. These training modules can serve as a guide for the faculty PI or can be used in collaboration with the safety coordinator.

Individual performance on safety quizzes is an excellent way to assess the student's ability to safely conduct research, a part of Outcome 1: the ability to critically analyze meaningful and technologically relevant data, and for thesis students, plan and safely conduct research. The chemical safety coordinator is certified to teach GHS Hazard Communications, has 40-hour HAZWOPPER certification, has a BA in Chemistry (ACS certified), and has a PhD in Biochemistry and Molecular Biology.

3. Performance on Graduate Coursework

Although student grades are not very effective in assessing student performance, graduate student GPA *in conjunction with other assessment tools* can be effective in demonstrating proficiency in fundamental mathematics and chemical engineering problem solving (Outcome 2: a demonstration of proficiency in fundamental mathematics and chemical engineering problem solving). Thus, graduate GPA is used in conjunction with student performance on the candidacy exam, thesis/dissertation defense or comprehensive exam to assess Outcome 2.

4. Graduate Exit Interview Questions

Each graduate student is required to complete an exit interview upon completion of their time at the University of Arkansas. In general, the graduate exit interview seeks information about future employment and asks the students to evaluate their professors. The exit interview also asks students about the suitability of the objective of our graduate program and seeks information on student perceptions about ethics and professional responsibility and effective communication. As such, the exit interview is an effective means of assessing:

- Outcome 3. Developing an understanding of professional and ethical responsibility
- Outcome 4. A demonstration of ability to develop and use effective written and oral communication skills

Program Assessment

The Program Goal was adopted by the faculty of the Department at its January 13, 2015 faculty meeting. The Goal was presented to the Department's Industrial and Professional Advisory Board (IPAC) for comment at its February 2015 meeting, and the membership unanimously stated that the Program Goal was appropriate. The program goals are assessed by questioning our constituents (the graduate students) on their exit interviews.

1. **Program Goal Assessment**

The program goals are assessed by questioning the constituents (the graduate students) on their exit interviews. Each student is asked the question: "Would you add, remove, or change any part of this objective, particularly with regard to how our educational objective meets your needs?" For the academic year 2022-2023, the response to this question was unanimously "No changes needed. The educational objective meets my needs as a student."

2. **Student Learning Outcomes Assessment Results**

   a. **Student Performance on Candidacy Exams and the Thesis/Dissertation Defense**

Student performance on candidacy exams (consisting of the student's presentation of the research proposal to the graduate committee) and the thesis/dissertation defense (or comprehensive exam for the MS non-thesis option only) is used to assess student ability in three of the four outcomes:

- Outcome 1. The ability to critically analyze meaningful and technologically relevant data, and for thesis students, plan and safely conduct research
- Outcome 2. A demonstration of proficiency in fundamental mathematics and chemical engineering problem solving
- Outcome 4. A demonstration of ability to develop and use effective written and oral communication skills

Table 2 presents results from the data collected between the Fall 2015 to the Spring 2023 semesters. Twelve MS students presented their final thesis defenses, 25 PhD students presented their research proposal as the candidacy exam, and 28 PhD students presented their final dissertation defenses. In general, the students performed between "good" to "excellent" on each of the outcomes (Excellent = 3, Good = 2, Fair = 1, Poor = 0) on Outcomes 1- 3. Interestingly, PhD graduates score the highest on all three outcomes as would be expected from their longer time in the program as well as being at the end of their degree. In addition to the overall average of the students, scores by individual semesters can be seen in Figure 1. A general trend that can be seen from this figure is that student performances have been slightly increasing during the time of data collect, although there is variation between semesters probably due to variation in individual student performances. At this time, the Graduate Program Committee has recommended no changes to program based on these assessments. Since the current evaluation process has been in place, the program has now graduated 17 PhD students who were evaluated at both their proposal (candidacy exam) and final defense. The difference in their score from their defense compared to their proposal can be seen in Figure 2. In general, students' scores improved from their proposal to their exam as would be expected. However, these scores can be variable depending on the student. For example, student #7 who decreased in all areas, had the highest possible scores for their proposal, so it was more challenging for them to improve.

Table 2. Average Student Performance on PhD Candidacy Exams and the MS Thesis/ PhD Dissertation Defense

Outcome	Student Type	Proposal or Thesis	Number students	Average Score	St Dev
Outcome 1. Student has shown the ability to critically analyze meaningful and technologically relevant data, and for thesis students, plan and safely conduct research.	MS PhD PhD	T P T	12 25 28	2.29 2.43 2.64	0.63 0.47 0.41
Outcome 2. Student has demonstrated proficiency in fundamental mathematics and chemical engineering problem solving.	MS PhD PhD	T P T	12 25 28	2.25 2.35 2.58	0.56 0.49 0.38
Outcome 4. Student has developed and used effective written and oral communication skills.	MS PhD PhD	T P T	12 25 28	2.33 2.53 2.61	0.45 0.45 0.40

Excellent = 3, Good = 2, Fair = 1, Poor = 0

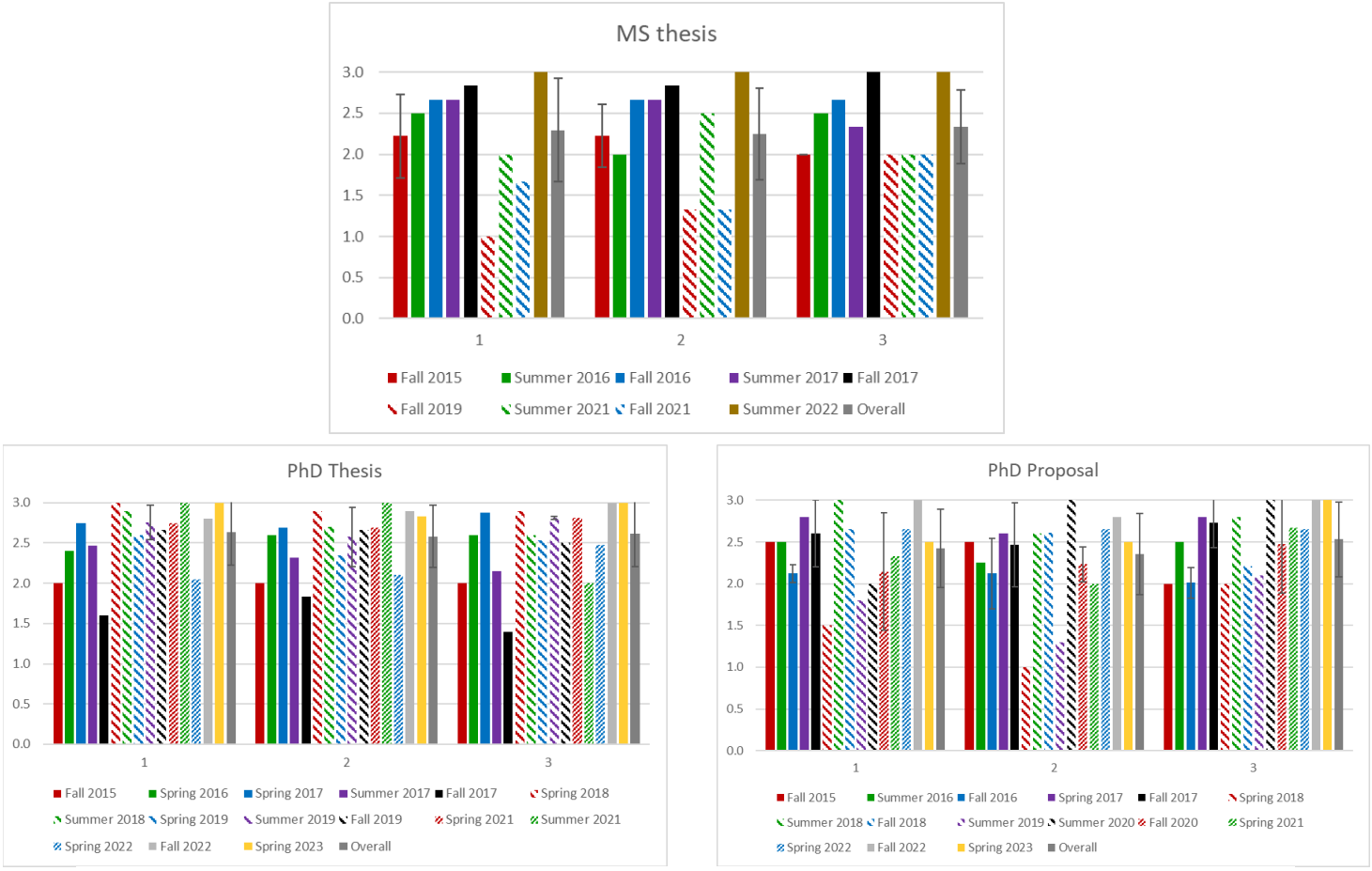

Figure 1. Student Performance on PhD Candidacy Exams and the MS Thesis/ PhD Dissertation Defense for Individual Semesters between Fall 2015 to Spring 2023

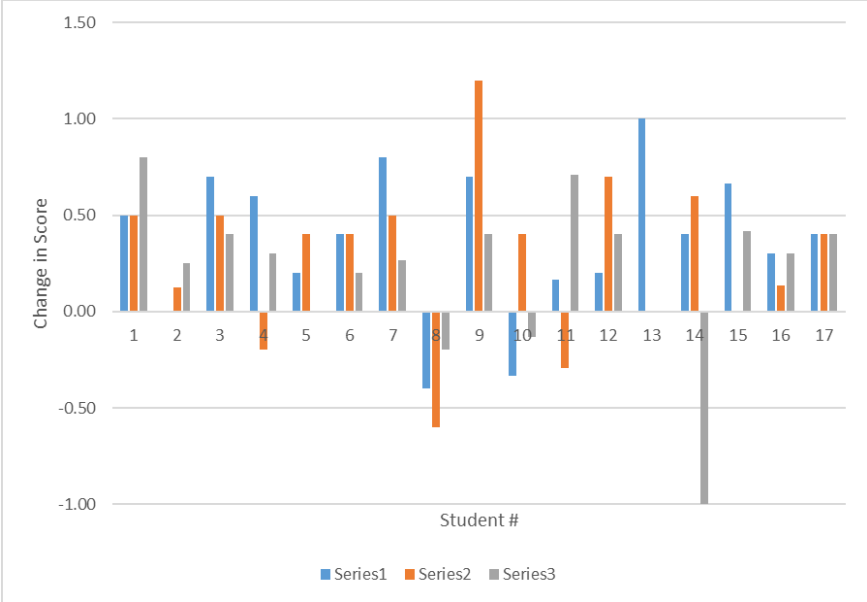

Figure 2. Student Change in Performance between PhD Defense and Candidacy Exams (Proposal) between Spring 2018 to Spring 2023.

b. Performance on Annual Safety Quizzes

Student performance on safety quizzes is an excellent way to assess the student's ability to safely conduct research, a part of Outcome 1: the ability to critically analyze meaningful and technologically relevant data, and for thesis students, plan and safely conduct research. Each student is required to pass each of the three basic safety quizzes with a grade of 90% or above. If a student fails an exam, they are required to attend additional training and to retake and pass the failed exam. According to safety records compiled by the Department's Safety Director, 72% of the students pass the three basic exams on the first try, deemed reasonable performance.

c. Performance on Graduate Coursework

Graduate student grade point average (GPA, 4.0 scale) *in conjunction with other assessment tools* can be effective in demonstrating proficiency in fundamental mathematics and chemical engineering problem solving as a part of Outcome 2: a demonstration of proficiency in fundamental mathematics and chemical engineering problem solving. Table 3 presents a summary of graduate student cumulative GPA at the end of the Spring 2023 semester, as well as the overall average cumulative GPA for all the Chemical Engineering graduate students. As is noted in the table, four students had a GPA of <3.5, however all students except one still had a GPA of at least 3.30, which is well above the required 3.0 for graduation. One student had a GPA < 3.0 which placed that student in academic probation. The average GPA for all students was 3.74, which is deemed excellent.

Table 3. Graduate Student Cumulative Grade Point Average

Number of Students with this Cumulative GPA					
<3.5	3.5-3.6	3.6-3.7	3.7-3.8	3.8-3.9	3.9-4.0
4	2	2	6	3	10
Average Cumulative GPA		3.74			

d. Graduate Exit Interview Questions

As was noted above, one section of the graduate exit interview asks students about the suitability of the objective of our graduate program and seeks information on student perceptions about ethics and professional responsibility and effective communication. As such, the exit interview survey is an effective means of assessing:

- Outcome 3. Developing an understanding of professional and ethical responsibility
- Outcome 4. A demonstration of ability to develop and use effective written and oral communication skills

Table 4 presents a summary of the results from the data collected between Fall 2018 – Spring 2023. Fifteen Chemical Engineering PhD students participated in the graduate student exit survey. The data collection begins in the Fall 2018 semester because the exit survey questions were changed to be more specific and therefore the data was not comparable to previous semesters. In addition, the survey was changed from an online format to a paper format which significantly increased student compliance. However, COVID changed the process to an email format which had lower compliance. In general, the students performed at or just below very well on the questions.

Table 4. Summary of Graduate Exit Interview Assessment Questions

Outcome	# of Students	Average Rating
Outcome 3. Developing an understanding of professional and ethical responsibility	15	
R1: Rate how informed you feel about your ethical and professional responsibilities as a researcher.		4.6
R2: Rate how informed you feel about how to report or handle an ethical violation.		4.5
R3: Rate how good you feel about the ethical and professional decisions that you made as a graduate student researcher.		4.9
Outcome 4. A demonstration of ability to develop and use effective written and oral communication skills	15	
R1: Rate how confident you feel about your oral presentation abilities.		4.2
R2: Rate how confident you feel about your written presentation abilities.		4.4

Very = 5, Reasonably = 3, Not at all = 1

e. Summary of Program Assessment

Table 5 summarizes the outcome assessment process, showing the four outcomes, the four assessment techniques, and the average student performance on the outcomes since the new assessment process was initiated in Fall 2015. As is noted, the students performed at least "good" on all the assessment tools and on each of the four outcomes. Overall, the program is performing well, and the assessment methods are providing useful feedback for the program. The Graduate Committee reviews the methods annually and proposes changes, when necessary, to continue improving the assessment process. This has resulted in wording changes to the candidacy / comprehensive exam document as well as a change in the graduate exit interview process.

The graduate program was externally reviewed this past academic year (2022-2023). The following section contains the recommendations from the reviewers and the plan of action as presented by the department, college, graduate school, and provost. The department and the graduate committee will take the recommendations from the reviewers and work to address them during the coming years.

Table 5. Summary of Program Assessment

Outcome/Goal	Assessment Technique			
	Candidacy Exam/ Comprehensive	Safety Quiz	Cumulative GPA	Exit Interview
1	Good	Excellent	-	-
2	Good	-	Excellent	-
3	-	-	-	Excellent
4	Good	-	-	Excellent

CHEG Response to External Reviewers 2022-2023

<table>
<tr><th colspan="3">1) Separate goals for MS and PhD programs</th></tr>
<tr><td rowspan="2">Department Response/Strategy</td><td>2023/2024 (Year 1)</td><td>- Benchmark regional and SEC Chemical engineering programs to provide basis for MS vs PhD goals & objectives; required coursework & research hrs. for BS/MS programs (Grad Committee)
- Vet revised MS and PhD program goals/obj with stakeholders, including advisory boards (Dept. Head)
- Submit paperwork for review & approval of BS/MS program in CHEG (Grad Coordinator & DH, in consultation with college leadership & Grad School)</td></tr>
<tr><td>2024/2025-2030/2031 (Year 2-5)</td><td>- Publish & implement revised goals/objectives for the MS & PhD programs (grad coordinator & dept. staff)
- Revise assessment tools for program progression & examinations to reflect the revised goals/objectives (grad coordinator & dept. staff)
- Revise exit surveys to measure student training against the revised goals/objectives (grad coordinator & dept. staff)
- Advertise & recruit for the BS/MS programs & monitor student enrollment in the new program (full faculty, oversight by grad coordinator & DH)</td></tr>
<tr><td>COE Dean</td><td colspan="2">- Described plan particularly appropriate for industry-based careers.
- Degree path identified could be described as ‘professional’ master’s program (vs a more traditional ‘research’ based MS program)
- Department is cautioned to be very explicit in its descriptions and recruitment materials if, in fact, there are two distinct paths for MS students.
- The ‘goals’ for research-based MS degree program may differ slightly (but distinctly) from those of a prof. degree. If so, this should be communicated clearly.</td></tr>
<tr><td>Grad Dean</td><td colspan="2">- Agrees with response</td></tr>
<tr><td>Provost</td><td colspan="2">- Agrees that each degree program should have different learning objectives and goals.
- There are models for an accelerated or 4+1 program in the COE which the program could utilize</td></tr>
</table>

<table>
<tr><th colspan="3">2) Assessment methods that are more readily comparable to peer programs</th></tr>
<tr><td rowspan="2">Department Response/Strategy</td><td>2023/2024 (Year 1)</td><td>- The dept. modified the evaluation of the graduate educational outcomes form used during both the candidacy exam and the thesis defense to include a section to track presentations at conferences, publications, conference proceedings, patents, and other deliverables. The new form was approved by the faculty and will be used immediately. (Grad coordinator & DH)</td></tr>
<tr><td>2024/2025-2030/2031 (Year 2-5)</td><td>- These assessment forms will be reviewed at the end of each semester for completeness and indication of program progression issues (Grad Coordinator)
- Data from the assessment forms will be compiled and used for the annual program assessment conducted at the Fall Faculty Retreat (Dept. Staff)</td></tr>
<tr><td>COE Dean</td><td colspan="2">- There is no indication that the development of the 'new' form was informed by policies and procedures used at peer and aspirational institutions.
- If indeed this is the case, the Department is strongly encouraged to consult with regional and SEC programs regarding the assessment of graduate programs.
- Evaluation of assessment data is, certainly, a vital piece in a continuous improvement process. The Department is encouraged to establish performance indicators, e.g., 'targets', for use in the annual evaluation process. The ABET process (and associated performance indicators) implemented at the undergraduate level could serve as an excellent example for developing a robust system at the graduate level. The Department is also encouraged to 'map' program goals and objectives against the total curriculum (courses, capstone-type projects, theses/dissertations, etc.) to identify the key spots within the curriculum having the most impact on achievement. Then, should the annual evaluation of assessment data reveal possible performance discrepancies, scrutiny of these key elements could be warranted.</td></tr>
<tr><td>Grad Dean</td><td colspan="2">- Agrees with response</td></tr>
<tr><td>Provost</td><td colspan="2">- Agrees that each degree program should have different learning objectives and goals.
- There are models for an accelerated or 4+1 program in the COE which the program could utilize</td></tr>
</table>

3) *Improve communication of expectations to the graduate* students since there does seem to be significant variability in those expectations. For e.g., the dept could consider establishing a firm deadline for the completion of the candidacy exam, as well as a clear rubric for assessing student performance on this exam		
Department Response/Strategy	2023/2024 (Year 1)	- The graduate handbook will be modified to indicate clearly the expectations for graduate students. - Proposed changes in the handbook will include a timeline with specific milestones such as selecting an advisor, establishing the thesis committee, completing the candidacy exam, committee updates, and thesis defense. - We will also include a rubric for assessing student performance in the candidacy exam as well as the thesis defense. [Graduate Coordinator] - In addition to the handbook, the expectations will be communicated to the faculty each year at the Fall Faculty Retreat and to the graduate students every semester as part of the department's seminar series. [Graduate Coordinator]
	2024/2025-2030/2031 (Year 2-5)	- Deviations from the milestones will be reported to the Department Head annually, and this information will be presented in the aggregate-along with the exit survey and assessment data-to the faculty at the fall retreat. [Graduate Coordinator]

COE Dean	- The plan for keeping the Graduate Handbook updated is appropriate. It is suggested that publishing substantive changes to the Handbook be limited to once per year (e.g., at the beginning of the academic year) to avoid the potential confusion created by mid-year changes. - The Department's response to the reviewers contains much top-down, Department-to- stakeholder (faculty and students) communication; a suggestion is offered: - Assess the effectiveness of the top-down communication by periodically (i.e. once every- other year) 'quizzing' students and faculty on key policies (i.e. when and how things are to be done in the program). This will help the Department strengthen both its communication procedures and content. - The plan for the annual reporting deviations from milestones is good. The Department is encouraged to follow-up on this with faculty whose students consistently exhibit such deviations; consistently failing to follow published policies could be an element in annual performance reviews of faculty.
Grad Dean	- No additional comments
Provost	- The provost Office agrees in improving communication of expectations to graduate students. The program is encouraged to work with the Associate Dean of the Graduate School on creating expectations and rubrics as well as the Associate Dean for the College of Engineering.

4) ***A minor recommendation is that the department could consider decreasing the requirements still further (since the total semester-hour load is still higher than***

for many chemical engineering departments), for example by condensing the transport material into a single course.	
Department Response/Strategy	- The department will evaluate removing the Transport II course as a core requirement and reducing the total number of course credits required by 3 credit hours. [Graduate Faculty Committee with review by Faculty]
COE Dean	- The Department is strongly encouraged to benchmark the balance of coursework versus dissertation hours (for the PhD) against peer and aspirant programs. This element should coordinate closely with the review-suggestion regarding program goals and objectives. - The faculty are encouraged to consider how both the academic program (coursework) and the dissertation contribute to the attainment of program goals/objectives. - Finally, the Department is encouraged to seek input from its external stakeholders regarding the academic and research preparation of its graduates. - These three pieces: the benchmarking study, the evaluation of program goals and objectives, and external stakeholder input, should help guide the program in 'right-sizing' coursework requirements.
Grad Dean	- No additional comments
Provost	- The provost Office agrees with the benchmarking approach suggested by the Dean.

5) We also recommend that the department consider implementing at least one other milestone on the route to the PhD degree.

Department Response/Strategy	- The department agrees with the suggestion of the reviewers. A new milestone will be added that requires students to have annual committee meetings. The annual committee meetings will result in an assessment and feedback form that is completed by each committee member individually and shared with the student and their advisor. - This milestone will be described in the handbook and the graduate coordinator will discuss this milestone each semester during orientation with the graduate students. [Graduate Coordinator and Department Head drafts form and edits Handbook; review by Faculty]
COE Dean	- The implementation of an annual graduate committee meeting with the students is a very positive and proactive step. - The Department might consider having the student prepare a self-assessment to be provided to the committee in advance of the annual meeting. - Allow the student the freedom to comment not only on their own performance, but also on items related to the support provided by the Department and faculty adviser.
Grad Dean	- Agrees with this response
Provost	- The provost Office agrees in annual assessment of graduate students in the PhD program and annual meetings. - The program is encouraged to utilize the form and procedure set by the Graduate School for annual review and work with the Associate Dean of the Graduate School to integrate the program's feedback mechanisms in concert with the existing Graduate School policy.

6) The department could consider developing and communicating guidance to PhD students that includes the publication of a certain number of peer-reviewed journal articles as a typical expectation

Department Response/Strategy	- The department agrees that graduate students should have a certain number of peer- reviewed publications. - Participation in writing and submitting peer-reviewed publications supports the development of communication skills needed for professional success, provides project outcomes to support external research, gives the student and their research external visibility, ensures a strong thesis/dissertation, and provides an additional milestone for program progression. - Thus, the department plans to address this by including language in the handbook that says that by the defense of their MS thesis or PhD dissertation, students must have at least one or three dissemination items submitted, respectively. Dissemination items may include peer- reviewed articles, patents, peer-reviewed conference papers/proceedings, as specified by the consensus of the student's thesis/dissertation committee. - The department recognizes a strict publication requirement may carry difficulties in implementation due to the difference in research fields, challenges related to the peer-review process, pressures for students and faculty to publish in predatory journals, etc. Therefore, exceptions to this policy will be considered. - The process for appeals regarding the publication/dissemination type and number will include a written request from the student and their advisor to the Graduate Coordinator and Department Head. [Graduate Coordinator and Department Head drafts form and edits Handbook; review by Faculty]
COE Dean	- As a policy, the Department's plan is appropriate. While a student's committee must be given flexibility in establishing the number and type(s) of dissemination items required of the student, caution is warranted to ensure equity is maintained across the whole of the student committees. - The Department is encouraged to begin this effort with an educational program for the faculty - both advisers and committee members. It is crucial to ensure that there are no misunderstandings among the faculty regarding both what the policy contains and how the policy is to be enforced. - The Department is also encouraged to consider allowing graduate student leaders, and/or recently graduated Ph.D. students, to review and comment on the policy prior to implementation. Giving the students a voice in the process may yield significant benefits in the long term.

Grad Dean	- No additional comments
Provost	- The provost Office agrees with the Dean's response. The Provost's Office also reminds the program that any firm requirements to be listed officially in the academic catalog to be officially binding on a student.

7) ***We recommend that the department advocate/or an orientation program/or new faculty at the school or university level. In a related topic, we recommend that the department consider implementing a more formal mentoring program/or tenure track faculty.***

Department Response/Strategy	2023/2024 (Year 1)	- Since Fall 2021, the chemical engineering department has been following the mentoring protocol outlined by UA's NSF ADVANCE Bridge Program which has a two-phase approach to the mentoring process. - During Year 1, new faculty are mentored by a multi-person Welcoming Team. The goal is that this team can help to introduce the new faculty member to UA and the NWA area and help make connections between them and others on campus so they can grow their network.
	2024/2025-2030/2031 (Year 2-5)	- Year 2+ involves a transition to a Success Team to provide guidance toward the next step in their PIT pathway. Our two newest faculty members (Will Richardson - Associate Professor, Jacob Monroe - Assistant Professor) have mentors from their department, a different department in the college of engineering, and from another college on their Welcoming Teams- with the aim that they will have access to varied perspectives and multiple resources. - In addition, the Department Head has worked with the other Assistant Professors in the department (who were onboarded during Covid) to (re)initiate mentoring programs for them based on their current professional needs and goals. [Department Head] - Beyond the programming listed above, UA's office of Vice-Chancellor for Faculty Affairs coordinates workshops throughout the year specifically for faculty cohorts-including new faculty-such that continued orientation and professional development activities are available to faculty throughout their first two years. [University Administration]
COE Dean	- The CHEG department is a leader in faculty mentoring, as indicated by the response to the comment. - As stated, the College of Engineering is 'ramping up' faculty development and mentoring programs across the college, many of which are specifically targeted at new faculty. The Department is encouraged to continue to ensure that mentoring is available for both the research and the academic mission(s) and responsibilities of a faculty member.	

Grad Dean	- No additional comments
Provost	- The program is encouraged to take advantage of workshops and sessions held by the Office of Faculty Affairs housed in the Provost's Office both regarding orientation sessions and new faculty development. - Program faculty are encouraged also to contact that office if they have suggestions for additional programing at orientation.

8) The role of the department Personnel Committee should be examined, so that advice and recommendations from the Department Head and this committee are aligned. The department could consider examining the method of communicating with faculty about expectations for tenure and promotion at a broader level, to ensure that faculty develop realistic expectations about timelines while receiving positive feedback as appropriate.	
Department Response/Strategy	- The Department Head and Chair of the Personnel Committee will examine the roles of the Personnel Committee, interactions during the evaluation process, and expected outcomes of the Personnel Committee's activities. - For instance, this could include defining the role of the Personnel Committee in providing performance data across the faculty ranks using a common measuring stick (i.e., rubric) agreed on by the Personnel Committee and Department Head, making suggestions on resources that would support success/improvement in a particular performance area, ensuring self-consistency in the recommendations made to the department Head, and defining an internal scoring and discussion timeline for the evaluation process. - The Department Head will then communicate with the Personnel Committee and full faculty regarding the Personnel Committee's role in making recommendations to the Department Head, processes and timelines for evaluations, and the goals of the Personnel Committee recommendations and Department Head assessment toward successful performance and progression towards promotion and tenure milestones.

COE Dean	- For the past 9 months, the College has engaged in a substantial overhaul of both the College Personnel Document, and the associated Departmental Personnel Document(s). - It is understood that the Department may specify evaluative criteria that differs from the College document and University policy (e.g., specific evaluative criteria may be 'stricter' at the Department level but cannot be 'less strict' than College/University policy). - However, roles and responsibilities of personnel committees, eligibility criteria for personnel committees, and other associated items are set by the College Personnel Document (which is based on university policy). - It is anticipated that the Department's Personnel Document will be finalized in Summer 2023.
Grad Dean	- No additional comments
Provost	- The program is encouraged to work with the Office of Faculty Affairs in the Office of the Provost as well as the College Dean's office on any changes to its committee structure, being aware, as the Dean's response indicates, that some committee functions are linked to university-wide policies.

9) The department would benefit from having additional staff support for graduate program administration, such as a half-time or shared position. This support would relieve the faculty graduate program director from more routine administration, especially related to graduate student recruiting, and could allow for expansion of recruiting-oriented activities.	
Department Response/Strategy	- The Department has identified a staff position that, as part of their duties, can provide support to the graduate program. - These activities include program progress tracking, communication with prospective and current graduate students, and general admin support to the Graduate Coordinator and Graduate Committee. - Additionally, the office and technical staff for the department will continue to support the graduate program through safety training, event planning, IT support, etc.
COE Dean	- The College of Engineering also anticipates increasing the number of support staff in these areas, to supplement efforts at the department level.
Grad Dean	- No additional comments
Provost	- No additional comments

10) We recommend that the department work with the Dean to establish a plan to replace faculty on an agreed-upon timeline, taking into account the possibility for failed searches, the likelihood of future retirements, and the possibility of delays in faculty arriving at the university.	
Department Response/Strategy	- The Department would support the development of a faculty hiring plan, in concert with the Dean/College, to ensure the timely replacement and growth of chemical engineering faculty. - The loss of faculty without immediate replacement creates hidden workload burdens (e.g., due to quick/unplanned service reassignments and overload assignments, teaching load increases), reduced research productivity, gaps in collaboration bridges, and an overall loss of momentum for the department's scholarly activities. - Proposed is a multi-pronged approach: - (1) 50% of vacated faculty lines are available for replacement hires immediately. - (2) allowing replacement faculty searches outside of the traditional fall ad/spring offer/following fall start timeline (i.e., January or Summer start dates); - (3) approving hires based on plans and growth strategies (e.g., proactive hire based on future retirement, removing signed separation letter requirement prior to position request. [Department Head, Dean of the College of Engineering]

COE Dean	- The Dean's office supports the concept of estimating multi-year hiring needs. Major issues to be resolved include funding (including startup package funding), student enrollments and growth trends, and the mix of tenured/tenure-track and non-tenure-track faculty within a given Department to address both teaching and research needs. - In addition, it is difficult to firmly establish multi-year hiring plans due to 'unexpected' hires, e.g., spousal accommodations, collaborative high-impact multi-disciplinary hires, etc. - many, if not most, of which require funding from the existing salary and startup funding pool. - This issue is receiving significant attention in the newly developed Strategic Plan for the college.
Grad Dean	- No additional comments
Provost	- The Provost's Office agrees with the Dean's response and supports the College in utilizing its resources appropriately to address both teaching and research needs.

11) While these off-campus facilities provide modern lab spaces, the department should be intentional about making sure that students working in these labs regularly interact with students working in the Bell Engineering Center.	
Department Response/Strategy	- The Department agrees with the reviewers. Currently, one way the department ensures graduate students working in labs outside of BELL interact with the rest of the students is mainly through the weekly graduate seminar series. - In addition, the Arkansas Chemical Engineering Graduate Student Organization (AChEGS) has been quite active in organizing social events for all graduate students, especially since we started back in-person after the Covid pandemic. - Lastly, the department has organized other events during 2022 for students to interact with each other including a welcome picnic early in the fall semester to welcome new graduate students, a reception at the AIChE annual meeting, a 'scholarship for fellowship' event to celebrate the success of our graduate students, a celebration of graduating graduate students, among others. - While the COVID pandemic made it difficult to do these sorts of events for a few years, now we are actively performing more events to ensure that all students interact with each other as well as with staff and faculty. [Graduate Coordinator, Department Head, AChEGS officers]
COE Dean	- The Department is a leader in the College of Engineering regarding outreach to current students and growing its students into a true graduate student community. - The Department is encouraged to work with the College on efforts to extend these experiences into cross-disciplinary activities for the graduate student population.
Grad Dean	- The above recommendations are appropriate. The department, if not already, develop a "DSO" - designated student organization for membership in GPSC - and having periodic departmental meetings to discuss issues and how to be represented in campus governance.
Provost	- The Provost's Office agrees with the Dean's Office response and the departmental plan to increase engagement. No additional comments.

12) We recommend that the department develop a plan with the College regarding space for new faculty hires.	
Department Response/Strategy	- The College has been actively inventorying space available in BELL and other college buildings. - The Department would support the development of a space plan, in concert with the Dean/College, to ensure adequate lab and office space is available for new faculty hires. [Department Head, Dean of the College of Engineering]
COE Dean	- Indeed, space planning is at the forefront of the College's efforts to ensure that all faculty and students have access to the resources they need to be successful. - We anticipate receiving the results of a comprehensive space review and study in early May 2023; it is hoped that this study will be the needed groundwork for a subsequent comprehensive space-use plan. - This first step - ensuring our existing spaces are used to their greatest efficiency and capacity - is vital for planning new space. The College also acknowledges in its new Strategic Plan the absolute need for substantial new space to accommodate projected growth.
Grad Dean	- No additional comments
Provost	- The Provost's Office is leading a cross-campus space utilization study and has engaged the College of Engineering in this effort.

13) The department may wish to consider a more aggressive effort to recruit these students at an early stage.	
Department Response/Strategy	- The Department recruiting plan involves a tight collaboration with the College of Engineering. The department graduate coordinator works closely with the graduate recruiter for the college to recruit students. - Some of the current efforts involve a virtual open house, a luncheon to recruit undergraduate students from the University of Arkansas, and an in-person open house. - Other recruiting activities involve actively reaching out to databases such as ENGINE, GEM, and GRE, having a graduate recruiting table at the American Institute of Chemical Engineers annual meeting, using social media (Twitter, Linkedin, Facebook), contacting students from peer institutions interested in graduate school as provided by Department Heads, and direct recruitment by individual faculty members.
COE Dean	- One of the strengths of the College is the graduate recruiting program. As stated, the College recruiting team works closely with the departments on recruiting efforts, and tailors its programs to the specific needs of departments.
Grad Dean	- The Graduate Dean's office concurs with this approach. GSIE can provide recruiting and marketing communication templates. - If additional information about the program is given to the GSIE recruiter, they can distribute information in their recruiting events. - The program may want to consider recruiting their best undergraduate and honors students. GSIE provides some limited financial resources to support recruiting efforts (Graduate Recruitment Assistance Fund).
Provost	- No additional comments