Program Assessment Report
MS Program Food Science
University of Arkansas
Academic Year 2019-2020

1. Department Name & Contact Information
Department of Food Science
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2. Department Mission
The mission of the Department of Food Science is to serve as the primary source of higher education, fundamental and applied research, and public service associated with enhancing the wholesomeness, quality and availability of food, improving the health of Arkansas residents, and adding value to raw agricultural products with particular emphasis on products relevant to Arkansas. The Department of Food Science promotes programs for achieving regional, national and international recognition of excellence while contributing to the advancement of the quality of life and professional development for Arkansans.

3. Program Goals
Upon the completion of the MS program in food science or nutrition, students will:

1. **Technical Knowledge**
- Demonstrate advanced knowledge and understanding in their area of emphasis.
- Demonstrate sufficiently broad knowledge across food science and/or nutrition disciplines outside of their core specialty area.

2. **Research and Scientific Inquiry Skills**
- Demonstrate scientific enquiry skills through the research performed.
- Demonstrate quantitative skills through the analysis of research data.

3. **Communication Skills**
- Demonstrate competency in written communication through their dissertation.
- Demonstrate competency in oral communication through their required seminars and oral defense.

4. Student Learning Outcome 1. Demonstrate advanced knowledge and understanding in their area of emphasis
A. **Assessment Measure 1.**
- Student knowledge will be assessed by the graduate committee during the proposal meeting and the defense. A determination by the committee is made individually based on information presented by students and through questions posed to the student. Graduate committees will design a line of questioning allowing the determination the depth of knowledge of the student in their specialty area.
- This measure is direct.
- Assessment measurement tool (**See Appendix 1)**

B. **Acceptable** and **Ideal Targets** (<u>not required</u> for indirect measures).
- Acceptable Target: No students in the novice category, 80% of students in the Advanced or above category and at least 20% of students in the Expert category.
- Ideal Target: 100% in the Advanced or Expert category.

C. **Summary of Findings. (n = 8)**

	Novice	Intermediate	Advanced	Expert
Technical Knowledge in core scientific area (food chemistry, microbiology, etc..)	0	1	5	2

- Both acceptable and ideal targets were met according to our preliminary data.
- The results are consistent with previous assessment years and indicate our MS students are meeting or exceeding the program expectations. Based on this, the data are indicative of MS program in FDSC that provides a solid foundation for our students.

D. **Recommendations** (<u>not required</u> for indirect measures)
- Only 25% of students (2 of 8) were considered experts in this learning outcome, we would like to see 100% of our graduate students in the expert category.
- Because each student is evaluated by their customized graduate committee, there also exists differences across each faculty member with respect to their interpretation of each outcome and competency level. We will continue look at the data to determine if there are any faculty who consistently score higher or lower compared the rest of the committee. However, thus far, we see no indication of this.

5. **Student Learning Outcome 2.** Demonstrate sufficiently broad knowledge across food science and/or nutrition disciplines outside of their core specialty area.
   A. **Assessment Measure 2.**
   - Student knowledge will be assessed by the graduate committee during the proposal meeting and the defense. A determination by the committee is made individually based on information presented by students and through questions posed to the student. Graduate committees will design a line of questioning allowing the determination the depth of knowledge of the student in their specialty area.
   - This measure is direct.
   - Assessment measurement tool (**See Appendix 1)**

   B. **Acceptable** and **Ideal Targets** (<u>not required</u> for indirect measures).
   - Acceptable Target: No students in the novice category, 80% of students in the Advanced or above category and at least 20% of students in the Expert category.
   - Ideal Target: 100% in the Advanced or Expert category.

   C. **Summary of Findings. (n = 8)**

	Novice	Intermediate	Advanced	Expert
Technical knowledge outside of the core research area.	0	1	5	2

- Both acceptable and ideal targets were met according to our preliminary data.
- The results do not align with previous assessment years though likely because of graduating over two times as many MS students compared to years past. However, we typically see a majority of students in the expert category with a minority in advanced.

D. Recommendations (not required for indirect measures)
- Only 25% of students (2 of 8) were considered experts in this learning outcome. This indicates that our MS students need to be exposed to technical knowledge outside of their area of expertise. Because of the limited time given to a MS degree (2 years), it is more difficult to achieve this when compared to a PhD program.
- Although the idea target was met, we would like to move more students into the Expert level. We have met numerous times as a faculty to discuss curricula changes that will allow our students to be more fluent in knowledge outside of their core research area. Previously we explored a graduate course in food science to expose students to various areas, but after the first offering, faculty were no longer supportive of this option. Thus, we are still in discussions about how to better develop the breadth and depth of knowledge obtained by out PhD students.

6. **Student Learning Outcome 3.** Demonstrate scientific enquiry skills through the research performed
   A. Assessment Measure 3.
   - Student knowledge will be assessed by the graduate committee during the proposal meeting and the defense. A determination by the committee is made individually based on information presented by students and through questions posed to the student. Graduate committees will design a line of questioning allowing the determination the depth of knowledge of the student in their specialty area.
   - This measure is direct.
   - Assessment measurement tool (**See Appendix 2 – Items 1, 2, 4, 5)**

   B. Acceptable and **Ideal Targets** (not required for indirect measures).
   - Acceptable Target: No students in the novice category for any on the rubric sub-categories (1, 2, 4, and 5), 60% of students in the Advanced or above category and at least 20% of students in the Expert category.
   - Ideal Target: 100% at or above the Advanced level for all rubric sub-categories.

   C. Summary of Findings. (n = 8)

	Novice	Intermediate	Advanced	Expert
Topic Selection	0	0	3	5
Design Process	0	0	5	3
Conclusions	0	1	4	3
Limitations and Implications	0	0	5	3

   - Both acceptable and ideal targets were met for 3 out of the 4 subcategories according to our preliminary data.
   - The 'Conclusions' subcategory did not meet the ideal target.
   - The results are consistent with previous assessment years and indicate our MS students are meeting or exceeding the program expectations. There also was improvement in "Topic Selection" from previous years with nearly 100% of students in the expert category.

D. Recommendations (<u>not required</u> for indirect measures)

- Based on the results of each sub-category within this rubric, the graduate students are meeting or exceeding expectations for the program.
- There was a general lack of knowledge related to 'Conclusions'. This is potentially indicative of the students not being able to translate their findings to 'real-world' applications or to understand the impact of their work. However, these competencies are somewhat expected for MS students.

7. Student Learning Outcome 4. Demonstrate problem quantitative skills through the analysis of research data.

A. Assessment Measure 4.

- Student knowledge will be assessed by the graduate committee during the proposal meeting and the defense. A determination by the committee is made individually based on information presented by students and through questions posed to the student. Graduate committees will design a line of questioning allowing the determination the depth of knowledge of the student in their specialty area.
- This measure is direct.
- Assessment measurement tool (**See Appendix 2 – Item 3**)

B. Acceptable and **Ideal Targets** (<u>not required</u> for indirect measures).

- Acceptable Target: No students in the novice category for the rubric sub-category 3, 50% of students in the Advanced or above category and at least 20% of students in the Expert category.
- Ideal Target: 100% at or above the advanced for the rubric sub-category.

C. Summary of Findings. (n = 8)

	Novice	Intermediate	Advanced	Expert
Quantitative Skills	0	1	6	1

- Neither target was met according to our preliminary data, but the acceptable target was not met. Specifically, <20% of students were considered experts in 'Quantitative Skills'.
- The results are consistent with previous assessment years and indicate our MS students are mostly meeting the program expectations.

D. Recommendations (<u>not required</u> for indirect measures)

- These competencies are acceptable for MS students. However, improvement of quantitative skills is one area we are working towards throughout both our undergraduate and graduate programs via course development and selection.

8. Student Learning Outcome 5. Demonstrate competency in written communication through their thesis.

A. Assessment Measure 5.

- Students' written thesis will be used as the basis for assessing students' written communication skill. At the time of the thesis or dissertation submission to the graduate committee, committee members will be asked to fill out the rubric prior to the defense date.
- This measure is direct.
- Assessment measurement tool **(See Appendix 3)**

B. **Acceptable** and **Ideal Targets** (<u>not required</u> for indirect measures).
- Acceptable Target: No students in the novice category for any of the rubric sub-categories, 60% of students in the Advanced or above category and at least 20% of students in the Expert category.
- Ideal Target: 80% in the Advanced or Expert category for all rubric sub-categories.

C. **Summary of Findings. (n = 8)**

	Novice	Intermediate	Advanced	Expert
Content Development	0	0	6	2
Conventions	0	1	4	3
Sources	0	0	4	4
Syntax and Mechanics	0	0	5	3

- The acceptable target met according to our preliminary data.
- The ideal target was not met due to one student rated as Intermediate in the 'Conventions' subcategory.
- The results are consistent with previous assessment years and indicate our MS students are mostly meeting the program expectations.

D. **Recommendations** (<u>not required</u> for indirect measures)
- Based on the results of each sub-category within this rubric, the graduate students are mostly meeting expectations for the program with respect to written communication skills.
- Of note, previous assessments have shown students in the Intermediate category for some of these rubric sub-categories.
- To continue improving our students' written communication skills, we will consider recommendation of available courses that address this such as a Scientific Communication course offered within or outside of Bumpers College.

9. Student Learning Outcome 6. Demonstrate competency in oral communication through their required seminars and oral defense.

A. **Assessment Measure 6.**
- Students' oral communication competencies will be assessed on multiple occasions during the graduate program. Assessment will be made for the two seminars required for the completion of the graduate program in food science. The grading rubric utilized in the food science seminar class will be used for that purpose. In addition, the final defense seminar will be assessed using the rubric presented in Appendix 4.
- These measures are direct.
- Assessment measurement tools **(See Appendix 4)**

B. **Acceptable** and **Ideal Targets** (<u>not required</u> for indirect measures).
- Acceptable Target: No students in the novice category for any of the rubric sub-categories, 60% of students in the Advanced or above category and at least 20% of students in the Expert category.
- Ideal Target: 80% in the Advanced or Expert category for all rubric sub-categories.

C. Summary of Findings. (n = 8)

	Novice	Intermediate	Advanced	Expert
Organization/flow	0	1	1	6
Language/delivery	0	0	2	6
Clarity, legibility and visual designs	0	1	3	4

- The acceptable target met according to our preliminary data.
- The ideal target was not met due to one student rated as Intermediate in both the 'Organization' and 'Clarity' subcategories.
- The results are consistent with previous assessment years and indicate our MS students are mostly meeting the program expectations.

D. Recommendations (not required for indirect measures)
- Based on the results of each sub-category within this rubric, the graduate students are mostly meeting expectations for the program with respect to oral communication skills.
- To continue improving our students' oral communication skills, we will consider recommendation of available courses that address this such as a Scientific Presentations course offered within or outside of Bumpers College.

10. Overall Recommendations
- While nearly all of the acceptable and ideal targets were met for each Learning Outcome within our MS Program, there is always room for improvement. It seems that quantitative skills is the most critical knowledge area where improvement can be obtained through better course selection by graduate student advisors.
- In addition, broadening the knowledge of our MS students in areas outside of their expertise will be critical to address. As mentioned previously, we are exploring changes to our graduate curriculum.
- Another area that could be improved is related to oral and written communications. While we will continue to offer opportunities to improve these skills, the outcomes are consistent with the abilities of MS students as many of these communication skills develop with practice over time.

11. Action Plan
- We will continue to discuss graduate curriculum as faculty in order to address gaps in critical knowledge areas. As indicated previously, a course was developed to address technical knowledge outside of the students' core research area, but after one offering, there was lack of consensus and support from faculty so the course has been put on hold.

12. Supporting Attachments
- Appendices 1, 2, 3, and 4 (rubrics)

Appendix 1: Assessment Rubric for Technical Knowledge

		Novice	Intermediate	Advanced	Expert
Technical Knowledge	Technical Knowledge in core scientific area (food chemistry, microbiology, etc..)	Knowledge is very narrow and in most cases inaccurate. When knowledge has been gained, it is based on unreliable sources. Understands current literature poorly.	Knowledge is narrow but in most cases accurate. Knowledge is mostly based on existing literature from reliable sources.	Knowledge is broad around the student area of expertize and is accurate. Knowledge is routed in existing literature.	Knowledge is advanced in a variety of topics around the student's area of expertise. Knowledge is based on recent literature. Understands the existing literature well enough to be critical.
	Technical knowledge outside of the core research area.	Knowledge in other core areas of food science and/or nutrition (other than specialty) is cursory. Knowledge is less than would be expected after the completion of graduate level classes in food science and/or nutrition.	Displays some knowledge in other core areas of food science and/or nutrition (other than specialty). Knowledge is limited to a few disciplines.	Display knowledge in most food science and/or nutrition core areas. Knowledge is broad and indicative of mastery of graduate level courses taken.	Displays advanced knowledge in all food science areas discussed. Knowledge is broader than that obtained through graduate level classes and indicates a significant amount of self learning.

Appendix 2: Assessment Rubric for Scientific Enquiry Skills

		Novice	Intermediate	Advanced	Expert
Problem solving and critical thinking skills/ Scientific enquiry skills	Topic Selection	The research topic is defined but is general and lacks justification. The research does not seem to make hypotheses and objectives are vague. It is unlikely for the research to have an impact of the field of study.	The research topic and justification for the research need are defined. Hypotheses and objectives are stated but lack clarity. The research topic is not very novel and potential impact is limited.	The research topic and justification for the research need are defined. Hypotheses and objectives are for the most part clear. The topic may not be truly innovative but the research has the potential to make contributions to the literature.	The research topic and justification for the need are well defined. Hypothesis and objectives are clear. The topic is innovative and the research has the potential to be impactful
	Design Process	Research design demonstrates a poor understanding of the methodologies or theoretical framework. The methods selection do not address the objectives.	Critical elements of the methodology or theoretical framework are missing, incorrectly developed or unfocused.	Critical Elements of the methodology or theoretical framework are appropriately developed, however, more subtle elements are ignored or unaccounted for.	All elements of the methodology or theoretical framework are skillfully developed. Appropriate methodology or theoretical frameworks may be synthesized from across disciplines or sub disciplines.
	Quantitative Skills	Displays poor quantitative skills. Does not use statistics or uses statistics incorrectly. Does not master the basics of experimental design. Lists results but they are unorganized	Displays average quantitative skills. Uses statistics, mostly correctly, but does not necessary understand the basis for the tests performed. Has some knowledge of experimental design. Organizes results but the organization is not effective in revealing important findings.	Displays good knowledge of both experimental design and appropriate data analyses for the data at hand. Understands the basis for the tests performed. Organizes results to reveal important findings.	Displays outstanding knowledge of both experimental design and statistical analysis techniques. Uses some more advanced techniques for data analysis and/or visualization which allows the reveal of insightful results.
	Conclusions	States ambiguous, illogical or unsupportable conclusions from research findings.	States general conclusions that because of their generality, also apply beyond the scope of the research findings.	States conclusions focused solely on the research findings. The conclusions arise specifically from and respond specifically to the research findings.	States conclusions that are a logical extrapolation from the research findings
	Limitations and Implications	Presents limitations and implications, but they are possibly irrelevant and unsupported by the research.	Presents relevant and supported limitations and implications	Discusses relevant and supported limitations and implications.	Insightfully discusses in detail relevant and supported limitations and implications.

Appendix 3: Assessment Rubric for Written Communication Skills

		Novice	Intermediate	Advanced	Expert
Written Communication skills (Thesis/Dissertation)	Content Development	Uses appropriate content and relevant content to develop simple ideas in some parts of the work.	Uses appropriate and relevant content to develop and explore ideas through most of the work	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline .	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject and conveying the writer's understanding.
	Conventions	Attempts to use a consistent system for basic organization and presentation of the work.	Follows expectations appropriate to Food Science and/or Nutrition for basic organization, content and presentation.	Demonstrates consistent use of important conventions particular to food science and/or nutrition including basic organization, content presentation and stylistic choices.	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to the discipline including organization, content, presentation and stylistic choices.
	Sources	Demonstrates an attempt to use sources to support ideas in writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and scientific writing.	Demonstrates consistent use of credible and relevant sources to support ideas developed in the thesis or dissertation.	Demonstrates skillful use of high-quality, credible, relevant sources to support ideas developed in the thesis or dissertation.
	Syntax and Mechanics	Uses language that sometimes impedes meaning because of errors in usage.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses straightforward language that generally conveys meaning to readers. The language in the thesis or dissertation has few errors.	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.

Appendix 4: Assessment Rubric for Oral Communication Skills

		Novice	Intermediate	Advanced	Expert
Oral Communication skills (Thesis/Dissertation presentation)	Organization/flow	Organizational Pattern (introduction, objectives, methods, results, conclusion) is not observable within the presentation	Organizational pattern is intermittently observable within the presentation.	Organizational pattern is clearly and consistently observable within the presentation.	Organizational pattern is clearly and consistently observable, is skillful and makes the content of the presentation cohesive.
	Language/delivery	Language choices are unclear and minimally support the effectiveness of the presentation. Language is not appropriate to the audience. Presenter is difficult to understand most of the time.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience. Presenter is difficult to understand some of the time. Presenter is not enthusiastic.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience. Presenter is not hard to understand and shows some level of enthusiasm.	Language choices are imaginative, memorable, and compelling and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience. The presenter is enthusiastic and professional.
	Clarity, legibility and visual designs	Visuals are not clear and not well organized. Fonts are too small or colors show poor contrast. Visuals are not pleasing. Color choices are poor. Many grammatical errors	Visuals are clear and for the most part well organized. Slide organization shows signs of inexperience (e.g. too much text). Overall, they are few illustrations. Some grammatical errors	Visuals are clear and well organized and for the most aesthetically pleasing. Slides are indicative of an experienced presenter and contain almost no grammatical errors. Efficient use of pictures, graphs, tables and illustrations.	Visuals are pleasing and professionally organized. Contain appropriate number of graphs, figures, pictures and illustration. Virtually no grammatical errors