Program Assessment Report Undergraduate Program in Food Science University of Arkansas Academic Year 2019-20120

1. Department Name & Contact Information

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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 Arkansas.

3. Program Goals

FDSC currently adheres to standards and learning outcomes approved by the Higher Education Review Board (HERB) of the Institute of Food Technologists (IFT) for undergraduate programs in Food Science and Technology (<u>http://www.ift.org/Community/Students/Approved-Undergrad-Programs.aspx</u>). As an approved program, we submit reports each year for review by the HERB. Our application for program approval was approved by IFT HERB in December 2019. We have included the complete list of Standards and Learning Outcomes with associated course id's that will be used for assessment as well as the approved IFT Assessment Plan (see **Appendices 1 and 2**, respectively) for your reference.

4. Student Learning Outcome 1. Appreciates the importance of and is committed to professional integrity and ethical values within the workplace.

A. Assessment Measure 1.

- FDSC 431V: Internship in Food Science
- Observation of student performance by the supervisor of an industrial internship. The supervisor reports their observation by means of a questionnaire which is completed at the end of the internship.
- This measure is direct.
- The primary instructor for the course is Jamie Baum; however, the assessment is based on supervisor observation.
- Assessment measure tool (Appendix 3)
- B. Acceptable and Ideal Targets (not required for indirect measures).
- The acceptable target is to have less than 25% of students in the Novice or Intermediate categories, with more than 20% in the Expert category. The ideal target is to have no student in the Novice or Intermediate categories, with more than 30% in the Expert category.

C. Summary of Findings. (n = 17)

	Novice	Intermediate	Advanced	Expert
Punctual in reporting to work, attending meetings and observing deadlines	0	0	6	11
Practices company ethics and values	0	1	5	11
Courteous and respectful to colleagues	0	1	4	12
Performs duties and interacts well with others in a professional manner	0	0	7	10

- Overall student performance greatly exceeded the prescribed criteria with the exception of two students in the intermediate category of one sub-category.
- The results are consistent with previous assessment years and indicate our undergraduate students are meeting or exceeding the program expectations. Based on this, the data are indicative of an undergraduate program in FDSC that prepares students for the workplace.

D. Recommendations (not required for indirect measures)

- While nearly all students were considered experts within most subcategories, there were two sub-categories where improvement could be had.
- First, 'practices company ethics and values' was achieved by 95% of the students in the program so the criteria of less than 25% below was met. However, we strive to have all students categorized in Advanced and Expert To address this, the importance of *always* adhering to a company's ethics and values, the course instructor and internship committee will provide a presentation on exactly what this means. In addition, we will request feedback from the companies about training or orienting students to these practices. **Of note, this was a slight improvement from the assessment for 2018-2019.**
- Second, one student was identified as only *sometimes* being courteous and respectful to colleagues. And then 24% were courteous and respectful to colleagues *often*. There is no reason that every student should not be in the expert level for being courteous and respectful to colleagues. To address this, the importance of *always* being courteous and respectful to colleagues, the course instructor and internship committee will provide a presentation on exactly what this means.

5. Student Learning Outcome 2. Clearly communicates scientific principles and data to lay audiences

- A. Assessment Measure 2.
- FDSC 431V: Internship in Food Science
- At the completion of the internship each student will give an oral presentation to the Internships Committee which comprises of four faculty members, the academic advisor and the department head. The presentation should contain a brief background of the company; what was done during the internship; and how what was learned in the classroom was useful during the internship. The presentation will be evaluated by each Committee member according to the direct measures in the rubric below. The final score for each direct measure is the average of Committee members' scores.
- This measure is direct.

- The primary instructor for the course is Jamie Baum; however, the assessment is based on committee feedback.
- Assessment measure tool (Appendix 4)

B. Acceptable and Ideal Targets (not required for indirect measures).

• The acceptable target is to have less than 25% of students in the Novice or Intermediate categories, with more than 20% in the Expert category. The ideal target is to have no student in the Novice or Intermediate categories, with more than 30% in the Expert category.

	Novice	Intermediate	Advanced	Expert
Maintains good eye contact and rapport without excessive notes	0	0	1	16
Exhibits good body language that enhances the presentation	0	0	3	14
Controls anxiety to present a relaxed presentation without verbal errors	0	0	2	15
Speaks clearly with confidence, enthusiasm and authority	0	1	4	12
The presentation is concise, clear, logical and includes all the requested elements	0	3	3	11
Slides are clear, well organized with appropriate use of color and effect	0	0	5	12
Effectively answers related questions	0	0	2	15

C. Summary of Findings. (n = 17)

- Student performance exceeded the prescribed criteria for the acceptable target, but ideally we do not want any students in the Novice or Intermediate categories which occurred in two sub-categories.
- These results are somewhat consistent with previous assessment years and indicate our undergraduate students are meeting or exceeding the program expectations.
- Based on this, the data are indicative of an undergraduate program in FDSC that prepares students to communicate scientific data and principles effectively.

D. Recommendations (not required for indirect measures)

 While nearly all students were considered experts within most subcategories, there were two sub-categories where improvement could be made. These sub-categories are primarily related to speaking clearly and confidently and providing concise and logical information when giving a presentation. Skills such as these can typically only be improved through practice. Therefore, we will explore more opportunities within the undergraduate program for students to give presentations in order to develop these skills.

6. Student Learning Outcome 3. Works effectively independently as well as in a team setting.

A. Assessment Measure 3.

- FDSC 431V: Internship in Food Science
- Observation of student performance by the supervisor of an industrial internship. The supervisor reports their observation by means of a questionnaire which is completed at the end of the internship.
- This measure is direct.
- The primary instructor for the course is Jamie Baum; however, the assessment is based on supervisor feedback.
- Assessment measure tool (Appendix 5)

B. Acceptable and Ideal Targets (not required for indirect measures).

• The acceptable target is to have less than 25% of students in the Novice or Intermediate categories, with more than 20% in the Expert category. The ideal target is to have no student in the Novice or Intermediate categories, with more than 30% in the Expert category.

	Novice	Intermediate	Advanced	Expert
Strongly motivated and takes initiative	0	3	6	8
Reliably and efficiently completes independent projects in a timely manner	0	3	3	11
Exhibits effective problem- solving skills	0	4	6	6
Performs duties and interacts well with others in a professional manner	0	0	7	10
Works effectively in a team	0	1	7	8

C. Summary of Findings. (n = 17)

- Student performance exceeded the prescribed criteria for the acceptable target.
- One subcategory was close to the 25% cut-off for students in Novice and Intermediate categories. This same subcategory barely exceeded the ideal criteria for >30% in Expert category.
- These results are consistent with previous assessment years and indicate our undergraduate students are meeting or exceeding the program expectations.
- Based on this, the data are indicative of an undergraduate program in FDSC that prepares students to effectively work in teams.

D. Recommendations (not required for indirect measures)

• Although the acceptable criteria set forth by the department was achieved, a several students were rated at the intermediate levels. This means that these students exhibited strong motivation and strong problem-solving skills only *sometimes*. This is probably not an acceptable outcome for the view point of an employer. In reviewing the rubric provided to the supervisor, the assessment committee is fine tuning the data collection instrument to better assess proficiencies. Supervisor assessment of student competencies have remained confidential.

When unsatisfactory ratings are given by the supervisor in the future, the department will request that the supervisor meet with the intern to discuss the shortcomings of the evaluation.

6. Overall Recommendations

- While all of the acceptable targets were met for each Learning Outcome assessed within our undergraduate, there is always room for improvement especially if we are striving to reach our ideal targets and move more students into the Expert Level of each subcategory.
- It seems that working in teams, presentation confidence, and professionalism in the work place are the most critical skills where improvement can be obtained through better guidance and advising and more opportunities to develop those skills in core FDSC courses.

7. Action Plan

- As outlined in the beginning of this document, we have a new program assessment plan that was approved by IFT HERB, and we will begin implementation in Fall 2020 (**Appendices 1 and 2**).
- Next, to improve student proficiencies in working in teams, presentation confidence, and professionalism in the work place, the following will be pursued:
 - We will look for ways in our current undergraduate curriculum to engage students in more team work activities prior to obtaining an internship.
 - We will look for ways in our current undergraduate curriculum to allow students more opportunities to practice presentations on technical materials.
 - The internship committee and instructor will meet with students individually prior to beginning the internship to stress the important of professionalism in the workplace. We will also reach out to companies providing internships and request that they provide information on what their expectations are with respect to the workplace and if those can be shared with students.

8. Supporting Attachments

• Appendices 1-5

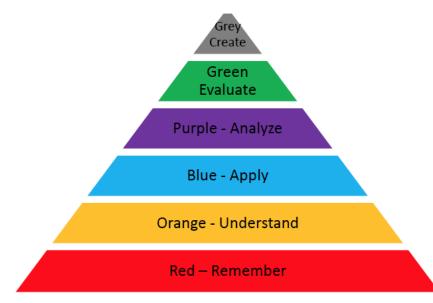
Standards	Essential Learning Outcomes	Course ID	Faculty
Food chemistry (FC)	FC.1. Discuss the major chemical reactions that limit shelf life of foods.	4304	РС
The structure and properties of food	FC.2. Explain the chemistry underlying the properties and reactions of various food components.		PC
components (water, carbohydrates, protein,	FC.3. Apply food chemistry principles used to control reactions in foods.	4304, 4713	PC, NH
lipids, other components and food additives); the	FC.4. Demonstrate laboratory techniques common to basic and applied food chemistry.	4304	PC
chemistry of changes occurring during	FC.5. Demonstrate practical proficiency in a food analysis laboratory.	4111L	YW
processing, storage, and utilization.	FC.6. Explain the principles behind analytical techniques associated with food.	4111L	YW
	FC.7. Evaluate the appropriate analytical technique when presented with a practical problem.	4111L	YW
	FC.8. Design an appropriate analytical approach to solve a practical problem.	4111L, 4304	YW, PC
Food microbiology (FM) Microorganisms in food including beneficial, pathogenic, and spoilage; the influence of the food	FM.1. Identify relevant beneficial, pathogenic, and spoilage microorganisms in foods and the conditions under which they grow.		TBD
	FM.2. Describe the conditions under which relevant pathogens are destroyed or controlled in foods.	4122	TBD
system on their growth, survival, and control.	FM.3. Apply laboratory techniques to identify microorganisms in foods.	4121L	TBD
*WILL NEED TO BE DECIDED BUT STARTED PROBABLY IN 2021 WHEN NEW FACULTY	FM.4. Explain the principles involved in food preservation via fermentation processes.	3103	RM
HIRED.	FM.5. Discuss the role and significance of adaptation and environmental factors (e.g., water activity, pH, temperature) on growth response and inactivation of microorganisms in various environments.	3103	RM
	FM.6. Choose relevant laboratory techniques to identify microorganisms in foods.	4122	TBD

Standards	Essential Learning Outcomes	Course ID	Faculty
	FS.1. Identify potential hazards and food safety issues in specific foods.	4122, 4713	<i>TBD,</i> NH
Food safety (FS)	FS.2. Describe routes of physical, chemical, and biological contamination of foods.	4122	TBD
Hazards (physical, chemical, biological)	FS.3. Discuss methods for controlling physical, chemical and biological hazards.	4713	NH
associated with foods and the food system; their transmission and	FS.4. Evaluate the conditions, including sanitation practices, under which relevant pathogenic microorganisms are commonly controlled in foods.	4122	TBD
control.	FS.5. Select appropriate environmental sampling techniques.	4122	TBD
	FS.6. Design a food safety plan for the manufacture of a specific food.	4713	NH
	FE.1. Define principles of food engineering (mass and heat transfer, fluid flow, thermodynamics).	4754	GA
	FE.2. Formulate mass and energy balances for a given food manufacturing process.	4754	GA
Food engineering and processing (FE)	FE.3. Explain the source and variability of raw food materials and their impact on food processing operations.	4754	GA
Food engineering	FE.4. Design processing methods that make safe, high-quality foods.	3103, 4754	RM, GA
principles; food preservation and processing: packaging	FE.5. Use unit operations to produce a given food product in a laboratory or pilot plant.	4754	GA
processing; packaging materials and methods; cleaning and sanitation; water and waste management.	FE.6. Explain the effects of preservation and processing methods on product quality.	3103, 4713, 4754	RM, NH, GA
	FE.7. List properties and uses of various packaging materials and methods	3103, 4713	RM, NH
	FE.8. Describe principles and practices of cleaning and sanitation in food processing facilities.		
	FE.9. Define principles and methods of water and waste management.	3103	RM

Standards	Essential Learning Outcomes	Course ID	Faculty
Sensory science (SS)	SS.1. Discuss the physiological and psychological basis for sensory evaluation.	4413	HS
Analytical and affective methods of assessing	SS.2. Apply experimental designs and statistical methods to sensory studies.	4413	HS
sensory properties of food.	SS.3. Select sensory methodologies to solve specific problems in food.	4413	HS
Quality assurance (QA)	QA.1. Define food quality and food safety terms.	3103	RM
Principles of food quality	QA.2. Apply principles of quality assurance and control.	3103	RM
control and assurance.	QA.3. Develop standards and specifications for a given food product.		
	QA.4. Evaluate food quality assessment systems (e.g. statistical process control).	3103	RM
Food Law and Regulations (FL)	FL.1. Recall government regulatory frameworks required for the manufacture and sale of food products.	3202	KG
Government regulations	FL.2. Describe the processes involved in formulating food policy.		KG
required for the manufacture and sale of	FL.3. Locate sources of food laws and regulations.	3202	KG
food products.	FL.4. Examine issues related to food laws and regulations.	3202	KG
Data and Statistical Analysis (DS)	DS.1. Use statistical principles in food science applications.	4304, 4413	PC, HS
Collection, analysis,	DS.2. Employ appropriate data collection and analysis technologies.	4113, 4413	YW, HS
interpretation, and presentation of data.	DS.3. Construct visual representation of data.	4304, 4413	PC, HS
Critical thinking and problem solving (CT)	CT.1. Locate evidence-based scientific information resources.	4713	NH
Scientific reasoning	CT.2. Apply critical thinking skills to solve problems.	4113, 4713, 431V	YW, NH, JB
through uncertainty in	CT.3. Apply principles of food science in practical, real-world situations and problems.	4713, 431V	NH, JB
scientific and technical situations.	CT.4. Select appropriate analytical techniques when presented with a practical problem.	4111L	YW
	CT.5. Evaluate scientific information.		

Standards	Essential Learning Outcomes	Course ID	Faculty
Food Science Communication (CM)	CM.1. Write relevant technical documents.	4304, 431V	PC, JB
Oral and written	CM.2. Create oral presentations.	4713, 431V	NH, JB
communication.	CM.3. Assemble food science information for a variety of audiences.		
Professionalism and leadership (PL)	PL.1. Demonstrate the ability to work independently and in teams.	4111L, 4304, 4713, 431V	YW, PC, NH, JB
Organization and project management; skills	PL.2. Discriminate tasks to achieve a given outcome.	4713	NH
necessary to work and interact with individuals	PL.3. Describe social and cultural competence relative to diversity and inclusion.	431V	JB
from diverse backgrounds.	PL.4. Discuss examples of ethical issues in food science.	3202	KG

Table 1. Guide to color coding of Bloom's Taxonomy Levels.



Assessment Year 1 (2 Standards, 3 ELOs per Standard)

Standard 1 (choose ONE)

Sensory Science (SS)

Essential Learning Outcomes (ELOs) (choose THREE)

SS 1 discuss the physiological and psychological basis for sensory evaluation, SS 2 apply experimental designs and statistical methods to sensory studies, SS 3 select sensory methodologies to solve specific problems in food

Standard 2 (choose ONE)

Food Laws and Regulations (FL)

Essential Learning Outcomes (ELOs) (choose THREE)

FL 1 recall government regulatory frameworks required for the manufacture and sale of food products, FL 3 locate sources of food laws and regulations, FL 4 examine issues related to food laws and regulations

Assessment Year 2 (2 Standards, 3 ELOs per Standard)

Standard 1 (choose ONE)

Food Chemistry (FC)

Essential Learning Outcomes (ELOs) (choose THREE)

FC 1 discuss the major chemical reactions that limit shelf life of foods, FC 6 explain the principles behind analytical techniques associated with food, FC 7 evaluate the appropriate analytical technique when presented with a practical problem

Standard 2 (choose ONE)

Food Engineering and Processing (FE)

Essential Learning Outcomes (ELOs) (choose THREE)

FE 1 Define principles of food engineering (mass and heat transfer, fluid flow, thermodynamics), FE 4 Design processing methods that make safe, high-quality foods, FE 6 Explain the effects of preservation and processing methods on product quality

Assessment Year 3 (2 Standards, 3 ELOs per Standard)

Standard 1 (choose ONE)

Food Microbiology (FM)

Essential Learning Outcomes (ELOs) (choose THREE)

FM 1 identify relevant beneficial, pathogenic, and spoilage microorganisms in foods and the conditions, FM 2 describe the conditions under which relevant pathogens are commonly destroyed or controlled in foods, FM 3 apply laboratory techniques to identify microorganisms in foods

Standard 2 (choose ONE)

Quality Assurance (QA)

Essential Learning Outcomes (ELOs) (choose THREE)

QA 1 define food quality and food safety terms, QA 2 apply principles of quality assurance and control, QA 4 evaluate food quality assessment systems (e.g. statistical process control)

Assessment Year 4 (2 Standards, 3 ELOs per Standard)

Standard 1 (choose ONE)

Food Safety (FS)

Essential Learning Outcomes (ELOs) (choose THREE)

FS 1 identify potential hazards and food safety issues in specific foods, FS 2 describe routes of physical, chemical, and biological contamination of foods, FS 4 evaluate the conditions, including sanitation practices, under which relevant pathogens are controlled in foods

Standard 2 (choose ONE)

Data and Statistical Analysis (DS)

Essential Learning Outcomes (ELOs) (choose THREE)

DS 1 use statistical principles in food science applications, DS 2 employ appropriate data collection and analysis technologies, DS 3 construct visual representation of data

Assessment Year 5 (3 Standards, 2 ELOs per Standard)

Standard 1 (choose ONE)

Critical Thinking and Problem Solving (CT)

Essential Learning Outcomes (ELOs) (Choose TWO)

CT 2 apply critical thinking skills to solve problems, CT 3 apply principles of food science in practical, real-world situations and problems

Standard 2 (choose ONE)

Food Science Communication (CM)

Essential Learning Outcomes (ELOs) (Choose TWO)

CM 1 write relevant technical documents related to food science, CM 2 deliver oral presentations related to food science

Standard 3 (choose ONE)

Professionalism and Leadership (PL)

Essential Learning Outcomes (ELOs) (Choose TWO)

PL 1 demonstrate the ability to work independently and in teams, PL 3 describe social and cultural competence relative to diversity and inclusion

My 5-Year Assessment Plan includes 11 Standards and 30 ELOs across the 5 years.

Yes

Appendix 2

	Novice	Intermediate	Advanced	Expert
Punctual in	Is NEVER	Is SOMETIMES	Is OFTEN	Is ALWAYS
reporting to work,	punctual in	punctual in	punctual in	punctual in
attending	reporting to	reporting to	reporting to	reporting to
meetings and	work,	work, attending	work, attending	work, attending
observing	attending	meetings and	meetings and	meetings and
deadlines	meetings and	observing	observing	observing
	observing	deadlines	deadlines	deadlines
	deadlines			
Practices	NEVER	SOMETIMES	OFTEN	ALWAYS
company ethics	practices	practices	practices	practices
and values	company	company ethics	company ethics	company ethics
	ethics and	and values	and values	and values
	values			
Courteous and	Is NEVER	Is SOMETIMES	Is OFTEN	Is ALWAYS
respectful to	courteous and	courteous and	courteous and	courteous and
colleagues	respectful to	respectful to	respectful to	respectful to
	colleagues	colleagues	colleagues	colleagues
Performs duties	NEVER	SOMETIMES	OFTEN	ALWAYS
and interacts well	performs	performs duties	performs duties	performs duties
with others in a	duties and	and interacts	and interacts	and interacts
professional	interacts well	well with others	well with others	well with others
manner	with others in	in a professional	in a	in a professional
	a professional	manner	professional	manner
	manner		manner	

Appendix 3

	Novice	Intermediate	Advanced	Expert
Maintains good eye contact and rapport without excessive notes	No eye contact with audience, because the report is read.	Minimal eye contact with audience, while the report is read.	Consistent use of direct eye contact with audience, but still returns to notes.	Holds attention of entire audience with the use of direct eye contact, seldom looking at notes.
Exhibits good body language that enhances the presentation	No movement or descriptive gestures.	Very little movement or descriptive gestures.	Made movements or gestures that enhances articulation.	Movements seem fluid and help the audience visualize.
Controls anxiety to present a relaxed presentation without verbal errors	Tension and nervousness is obvious; has trouble recovering from mistakes.	Displays mild tension; has trouble recovering from mistakes.	Makes minor mistakes, but quickly recovers from them; displays little or no tension.	Student displays relaxed, self- confident nature about self, with no mistakes.
Speaks clearly with confidence, enthusiasm and authority	Does NOT speak clearly with confidence, enthusiasm and authority.	SOMETIMES speaks clearly with confidence, enthusiasm and authority.	OFTEN speaks clearly with confidence, enthusiasm and authority.	ALWAYS speaks clearly with confidence, enthusiasm and authority.
The presentation is concise, clear, logical and includes all the requested elements	The presentation is NOT concise, clear, logical and does not include all the requested elements.	SOME of the presentation is concise, clear, logical and includes some of the requested elements.	MOST of the presentation is concise, clear, logical and includes most of the requested elements.	The presentation is CONSISTENTLY concise, clear, logical and includes all the requested elements.
Slides are clear, well organized with appropriate use of color and effects	Slides are NOT clear or well organized and lack appropriate use of color and effects.	SOME of the slides are clear and well organized and there is some appropriate use of color and effects.	Slides are MOSTLY clear and well organized and most contain appropriate use of color and effects.	Slides are CONSISTENTLY clear, well organized with appropriate use of color and effects.
Effectively answers related questions	Slides are NOT clear or well organized and lack appropriate use of color and effects.	SOME of the slides are clear and well organized and there is some appropriate use of color and effects.	Slides are MOSTLY clear and well organized and most contain appropriate use of color and effects.	Slides are CONSISTENTLY clear, well organized with appropriate use of color and effects.

Appendix 4

	Novice	Intermediate	Advanced	Expert
Strongly motivated and takes initiative	Is NEVER strongly motivated and takes initiative	Is SOMETIMES strongly motivated and takes initiative	Is OFTEN strongly motivated and takes initiative	Is ALWAYS strongly motivated and takes initiative
Reliably and efficiently completes independent projects in a timely manner	NEVER reliably and efficiently completes independent projects in a timely manner	SOMETIMES reliably and efficiently completes independent projects in a timely manner	OFTEN reliably and efficiently completes independent projects in a timely manner	ALWAYS reliably and efficiently completes independent projects in a timely manner
Exhibits effective problem solving skills	NEVER exhibits effective problem solving skills	SOMETIMES exhibits effective problem solving skills	OFTEN exhibits effective problem solving skills	ALWAYS exhibits effective problem solving skills
Performs duties and interacts well with others in a professional manner	NEVER performs duties and interacts well with others in a professional manner	SOMETIMES performs duties and interacts well with others in a professional manner	OFTEN performs duties and interacts well with others in a professional manner	ALWAYS performs duties and interacts well with others in a professional manner
Works effectively in a team	NEVER works effectively in a team	SOMETIMES works effectively in a team	OFTEN works effectively in a team	ALWAYS works effectively in a team