Food Science Program Self-Assessment

Student Evaluations

The IDEA evaluation of our food science courses is shown below. Each faculty member is encouraged to list at least three IDEA objectives on their syllabus, and these are the then scored by the students towards the end of the semester. The 2024-25 IDEA ratings for all Food Science Courses are listed below in Table 1.

Spring 2025	**Instructor**	**Progress on Objectives**	**Excellent Teacher**	**Excellent Course**
Food Processing	Bastarrachea	Similar	Lower	Similar
Sensory Science	Pico	Similar	Much Lower	Lower
Food Analysis	Martarneh	Much Higher	Higher	Higher
Food Microbiology	Oberg	Much Higher	Much Higher	Much Higher
Dairy Processing	Sharma	Similar	Lower	Similar
Fall 2024				
Sanitation and Safety	Reidhead	Similar	Lower	Lower
Chocolate Science	Ward	Similar	Similar	Similar
Food Chemistry	Park	Similar	Similar	Similar
Meat Technology	Martarneh	Higher	Higher	Higher
Food Engineering	Bastarrachea	Similar	Much Lower	Similar
Food Product Development	Ward	Much Lower	Lower	Lower
Food Laws	Savello	Higher	Similar	Similar

Student evaluations for our courses have shown substantial improvement compared to previous years. For example, the percentage of students rating their Progress on Objectives as "similar or higher" increased from 36% last year to 92% this year. Ratings of Excellent Teacher rose from 36% to 50%. Ratings of Excellent Course improved from 27% to 75%. These gains are encouraging and reflect positively on recent efforts within the program.

While our primary method for assessing instruction remains objective analyses of student learning outcomes, faculty members also use IDEA evaluations and student comments to inform their teaching portfolios for promotion and tenure reviews. In addition, individual instructors often draw on these evaluations and comments to refine their teaching practices. However, prior to Spring 2025, the program as a whole had not collectively discussed IDEA evaluation results.

Given the relatively low IDEA scores from the previous year, the faculty decided to address them directly. In Spring 2025, we invited Nathan Laursen from the Office of Data Analytics to a food science faculty meeting. Nathan explained how the IDEA evaluation system functions and offered practical suggestions for using the results to enhance teaching effectiveness.

The improved scores reported here were collected before this faculty meeting with Nathan. We look forward to reviewing next year's results to determine whether the discussion and recommendations lead to further gains.

Program Approval and Assessment for the Institute of Food Technologists

The Food Science BS program at Utah State University is an approved program by the *Institute of Food Technologists* (www.IFT.org). Globally, IFT sets guidelines for the background courses and curriculum to be covered in an approved food science program. USU received a new five-year approval by IFT in the Fall of 2019 which was based on a) *the appropriateness and expertise of the faculty*, b) *appropriate infrastructure including research and teaching laboratories*, and c) *a five-year assessment plan*. The food science program began to submit assessment reports to IFT in the fall of 2022. In this assessment scheme, the overall curriculum of food science is broken down into 11 major areas, called **Standards**, which have associated **Essential Learning Outcomes (ELOs)** For the first 4 years, we will assess three ELOs across two Standards per year. In the fifth year, we will assess two ELOs across two Standards.

The ELOs were written and approved by the Higher Education Review Board (HERB) at IFT to facilitate assessment of learning objectives critical to the development of a capable food scientist. More specifically, the verbs used in the ELOs describe a learning outcome and suggest a cognitive domain level at which the ELO can be assessed. IFT has also advised approved programs to go beyond subjective student course evaluations and grades in assessing student learning and provided some examples of Learning Assessment Techniques (LATs). In 2021 and 2022 the food science faculty met to discuss implementing novel LATs for student evaluation. All food science programs are given flexibility in implementing the LATs. This year is the fourth year of our IFT accepted program status, and we have one more evaluation next year to complete the five-year cycle.

Below, for each Standard the ELOs assessed, and the LATs used are shown, as well as when it was assessed and in which class. A description of the LAT is provided, followed by how it was implemented. Next, the findings are discussed, and possible corrective actions for future versions of the classes are discussed.

Results

The results are shown below. In 2024/2025 we assessed two standards (Critical thinking and problem solving, and Food Science Communication) and for each, there were three ELOs. Next, for each ELO, we used two different LATs. The results are presented in a table. The Standard, ELO, LATs, implementation, findings, and anticipated corrective actions are presented sequentially.

Assessment	Results
Standard	Critical thinking and problem solving
ELO assessed	Apply critical thinking skills to solve problems

Course ELO was assessed in	Sensory Evaluation of Foods (NDFS 5100/6100)
Period ELO was assessed	Spring 2024
Name of LAT 1	Technical Lab Report
Description of LAT 1	Students submitted formal lab reports detailing their hands-on activities, which were designed to reinforce class lectures, especially those focused on the application of discriminatory, descriptive, and affective sensory tests as well as the corresponding sensometric calculations. While these reports applied critical thinking to present and interpret their results as part of a formal discussion, critical thinking was also applied when performing the statistical analysis; for instance, for discrimination analysis, it was necessary to think critically about the sensory situation and decide if a one-tailed or two-tailed test was necessary, as well as the corresponding P-guess (also called P-chance). Additionally, the instructions of every sensory report had one or two questions that promoted the critical thinking of students.
Description of how LAT 1 was implemented with students	Six students enrolled in the Sensory Evaluation of Foods course participated in this LAT. The course involved ten weekly lab sessions (Mondays, 3:00-5:15 PM), and students were given 14 days from the time of the lab to submit each corresponding report via Canvas. Students were offered office hours with the instructor (Dr Joana Pico) to help with any doubts about the report or data analysis.
Description of the tool(s) used for LAT 1 analysis	The grading system for the laboratory component was designed to reward both practical engagement and analytical reporting, ensuring students were proficient in all facets of sensory evaluation. Two major

	criteria were used to grade students, including the quality and submission of the ten lab reports, and the interest and active participation during the lab activities. To earn any points for a given session, students must fulfill both conditions: attendance at the lab and submission of the corresponding report. The weight assigned to each report was 1.5 points each (out of 103 for the full course), reflecting the depth of analysis required (i.e., the sum of all labs reported resulted in 15% of the final grade). The system provided a safety net if a student missed a lab for a justifiable reason, as they retained the option to repeat the experiment and submit the report for the full 2 or 5 points, ensuring that unforeseen circumstances do not hinder their academic progression.
Key Findings for LAT 1	The average lab report score was 1.30 ± 0.16, which on a 10-point scale was 8.7 ± 1.1. The student with the highest average for the lab reports had a 9.55, the two students with the lowest averages were 7.90, and the other three students presented averages between 8.24 and 9.55. All of these results, considering that these students did not have previous experience with sensory science, demonstrate how the critical thinking of the students was clearly stimulated.
Description of how student performance for LAT 1 related to expectations for Standard 7 ELO 1	This ELO was successfully achieved by the majority of students. They demonstrated strong critical thinking by performing a technical and accurate discussion of the results, and also by obtaining correct results using the proper sensometric tools. Additionally, some of these students showcased exceptional critical thinking skills when replying to the questions posed in the report instructions. Generally, their engagement and efforts made with the

	reports met the expectations of the food science discipline.

Assessment	Results
Name of LAT 2	Technical Lab Report
Description of LAT 2	Students were asked to submit a formal lab report based on hands-on laboratory activities designed to reinforce lecture content on the impact of homogenization on the particle size distribution of whole, milk, cream, and homogenized milk at different pressures. The lab reports will include evaluation of quality of samples and relating that to processing treatment.
Description of how LAT 2 was implemented with students	This LAT was administered to 12 students enrolled in the Dairy Foods Processing lab. The students were divided into 4 groups, each consisting of three members. One student was made leader of the group who will co-ordinate the task between different members. The lab hours were on Friday from 9.00 AM to 3.30 PM in the Dairy Product Laboratory. Students had one week to submit each report electronically following the lab session.
Description of the tool(s) used for LAT 2 analysis	A scoring rubric (maximum 20 points per report) was used to evaluate accuracy, clarity, data interpretation, and discussion of underlying mechanisms.
Key Findings for LAT 2	Since it was hands on experiment and group report, each group scored 100% score meeting the expectations.
Description of how student performance for LAT 2 related to expectations for Standard 7 ELO 1	This ELO was largely met. Most students demonstrated a strong ability to produce well-structured and conclusive reports. All the student groups exhibited exceptional skills in interpreting data using statistical and graphical tools. Overall, students showed high engagement with scientific

	understanding, meeting expectations for critical thinking in solving food science problems.
Assessment	**Results**
Standard	Critical thinking and problem solving
ELO assessed	Select appropriate analytical techniques when presented with a practical problem
Course ELO was assessed in	Food Analysis (NDFS 5500/6500)
Period ELO was assessed	Spring 2025
Name of LAT 1	Analytic Memo
Description of LAT 1	All eight students in the class participated in this activity. They were provided with three different scenarios relevant to food analysis: (1) a product development case, (2) a consumer product complaint, and (3) a competitive product comparison. This was a take-home assignment that students completed over the course of one week. Each student was required to prepare a written report in which they addressed all three problems, justified their choice of analytical techniques, and explained their reasoning.
Description of how LAT 1 was implemented with students	A grading rubric designed to assess students' ability to identify and justify appropriate analytical techniques for each scenario was used. The rubric was categorized into 5 categories: Absent, Developing, Competent, Good, and Outstanding.
Description of the tool(s) used for LAT 1 analysis	The average score for all students was 78%, and 75% of the students (6 students) achieved a grade of ≥ 85%. Overall, students demonstrated excellent ability to select appropriate analytical techniques when presented with practical problems.
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	achieved a grade of ≥ 85%. Overall, students demonstrated excellent ability to select appropriate analytical techniques when presented with practical problems.
Description of how student performance for LAT 1 related to expectations for Standard 7 ELO 2	While students generally demonstrated strong skills in selecting appropriate analytical techniques for practical problems, there is an opportunity to further connect these choices to a broader range of real-world applications.

Assessment	Results
Name of LAT 2	Oral Presentation
Description of LAT 2	Sensory Evaluation of Foods (NDFS 5100/6100) culminated with a high-stakes, individual “Sensory Evaluation Project” of a commercial food product. Each student was assigned a unique real-world "problem/situation" from the food industry that they had to rigorously address using a combination of discrimination, descriptive, and/or affective tests; this project mimicked a real situation in which a company approached them requesting a solution to their sensory issue. The presentation was requested to have a few slides with an introduction and state of the art, why it was important to solve the sensory issue, a technical explanation of the sensory methodologies selected, an objective presentation of the results with the appropriate graphs and statistical outcomes, and a thorough discussion of the results with a clear conclusion and advice for the “imaginary” industry client. The successful completion of this project required not only accurate results (which accounted for 50% of the presentation grade) but also a professional oral defense with high-quality slides (30%) and expert replies to questions (10%) from classmates and Dr. Pico during

	the 13-minute defense and subsequent 2-minute Q&A period. Both the topics and the schedule were assigned following a raffle process, and all students were bound to their defense schedule, which was non-negotiable.
Description of how LAT 2 was implemented with students	The assignment was worth 10 points, and it was directly presented in person during a class session using PowerPoint slides. The presentation slides, as well as the data and sensometric calculations, were requested to be uploaded to Canvas for the instructor (Dr Joana Pico) with the main aim of reviewing that the presented data and conclusions were accurate.
Description of the tool(s) used for LAT 2 analysis	The assessment was based on several categories: • The veracity/accuracy of the results comprised a maximum of 50 % of the final presentation grade. • The quality of the slides was a maximum of 30 %. • The quality of the oral defense was a maximum of 10%. • The replies to the questions from the audience were a maximum of 10 % This final project required a selection of the appropriate sensory techniques for the students to be able to solve the practical food industry problem, especially considering that the highest portion of the final grade was based on the veracity/accuracy of the results, and these depended on the sensory technique chosen and properly applied by the students.
Key Findings for LAT 2	Students achieved a high average score of 8.28 ± 0.70 (out of 10) on the final project, and most of them were able to choose the right sensory technique. The student with the highest average for the final project was 9.50, the two students with the lowest

	averages were 7.60, and the other three students presented averages between 7.85 and 8.80. Although most students were able to choose the proper sensory technique, a few made minor errors in selecting the number of panelists and in using ANOVA when a t-test should have been chosen (even if the technique was correctly chosen). But in terms of the sensory method selection, the majority of presenters did it correctly.
Description of how student performance for LAT 2 related to expectations for Standard 7 ELO 2	The Expected Learning Outcome (ELO) was successfully achieved, particularly considering that students had no prior experience with sensory studies. Students exhibited good skills in choosing the proper sensory technique and, generally, they applied it correctly. The data confirms that the majority of students performed at or above the expected level, and they will be able to properly perform a sensory study in a food industry context.
Assessment	Results
Standard	Critical thinking and problem solving
ELO assessed	Evaluate scientific information
Course ELO was assessed in	Food, Technology and Health
Period ELO was assessed	Fall 2020, 2021
Name of LAT 1	Peer review
Description of LAT 1	Students were tasked with reviewing a term paper prepared by fellow students. Students were given a five-point rubric to use in the peer review.
Description of how LAT 1 was implemented with students	This course was required in the food science curriculum until fall of 2022. The evaluation took place over 2 years with 7 food science students in year 1, and 5 in year two.

Description of the tool(s) used for LAT 1 analysis	The instructor evaluated the peer reviews and assigned 1 to 5 points for evaluation of the information in the paper in each category.
Key Findings for LAT 1	The average rubric score was >4 in each category, indicating that the peer reviewers followed instructions and provided an effective review of the information presented.
Description of how student performance for LAT 1 related to expectations for Standard 7 ELO 3	Our goal for the evaluations was that they would be effective in helping their peers revise their paper. We were satisfied with the performance of the students in this assessment.
Assessment	Results
Name of LAT 2	Written assignment
Description of LAT 2	Students were asked to submit written assignments on various topics in dairy processing. Example topics were; Explain why milk doesn't coagulate when it is acidified (or renneted) if it is cold (4°C)? These assignments included scientific reasoning and problem-solving questions. As part of the assignment submission students were expected to write one-to-2-page scientific summary on the given problem using the concept taught to them in the class. Points were deducted for late submissions.
Description of how LAT 2 was implemented with students	Six students were enrolled in this class, and all 6 students were expected to submit the individual assignments. The students performing less were given chance to improve one time before the final grading.
Description of the tool(s) used for LAT 2 analysis	Criteria for grading included, succinct, accurate and clear write up with good examples. Points were deducted for errors

	related to grammar or vocabulary. Maximum score for the each assignment was 5.
Key Findings for LAT 2	The average oral score obtained throughout the semester for assignments was 96.19 out of 100 percent for 6 enrolled students. Minimum score was 90% and maximum was 99.64%. This clearly indicates that students were really engaged for learning critical thinking and problem-solving skills applying scientific theories related to milk processing.
Description of how student performance for LAT 2 related to expectations for Standard 7 ELO 3	Expectation for this ELO were well met. Students demonstrated proficient scientific understanding skills by effectively summarizing and presenting complex scientific content.
What could you do differently next year to further improve student performance on this standard?	It is unclear. We are happy with the student performance across these assessments. There is an opportunity for coordinating assessments across courses that we have been discussing in faculty meetings.
Assessment	Results
Standard	Food Science Communication
ELO assessed	Write relevant technical documents related to food science
Course ELO was assessed in	Food Chemistry
Period ELO was assessed	Fall 2024
Name of LAT 1	Technical Lab Report
Description of LAT 1	Students submitted formal lab reports based on hands-on laboratory activities designed to reinforce lecture content. Reports followed scientific writing conventions, with a particular emphasis on presenting results and articulating interpretations in the discussion section.

Description of how LAT 1 was implemented with students	This LAT was administered to 12 students enrolled in the Food Chemistry course. The course included 10 lab sessions, each conducted on Mondays from 1:30 to 5:20 PM. Students had one week to submit each report electronically following the lab session.
Description of the tool(s) used for LAT 1analysis	A scoring rubric (maximum 10 points per report) was used to evaluate accuracy, clarity, data interpretation, and discussion of underlying mechanisms. Students who went beyond basic expectations by integrating data analysis tools, such as graphs, received up to 0.5 bonus points per report.
Key Findings for LAT 1	The average lab report score was 96.2 ± 9.9. 10 students scored between 90 and 100, 1 student between 80 and 90, and 1 student between 60 and 70.
Description of how student performance for LAT 1 related to expectations for Standard 8 ELO 1	This ELO was largely met. Most students demonstrated a strong ability to produce well-structured and technically accurate reports. Several students showed exceptional skill in interpreting data and presenting patterns using graphical tools. Overall, students showed high engagement with scientific writing, meeting expectations for technical communication in food science.

Assessment	Results
Name of LAT 2	Product development proposal
Description of LAT 2	Students in NDFS 5920 (product development) prepared a report for a product they developed according to the Mars Wrigley IFT product development competition preliminary round submission.
Description of how LAT 2 was implemented with students	Eight students submitted a paper at the end of the term.

Description of the tool(s) used for LAT 2 analysis	A scoresheet for was adapted from the IFT competition that included sections for product description, process description, technical problem solving, safety, originality, economic feasibility and marketing.
Key Findings for LAT 2	All students scored >90% on the assignment. The assessment for each section showed that students were able to successfully address each section in the product development report.
Description of how student performance for LAT 2 related to expectations for Standard 8 ELO 1	The students met performance expectations for this assignment.
Assessment	**Results**
Standard	Food Science Communication
ELO assessed	Deliver oral presentations related to food science
Course ELO was assessed in	Food Chemistry
Period ELO was assessed	Fall 2024
Name of LAT 1	Oral Presentation
Description of LAT 1	As part of the final project, students selected a peer-reviewed article related to food chemistry, submitted a 3-page summary, and delivered an 8-minute oral presentation to the class. The focus was on clearly and concisely conveying the core scientific findings of the selected articles.
Description of how LAT 1 was implemented with students	All 12 students participated. Presentations were delivered individually over three class periods, with four students presenting each day. Each presentation was followed by a 5-minute Q&A session. The oral presentation was evaluated separately from the written summary.

Description of the tool(s) used for LAT 1analysis	A structured rubric assessed three categories: clarity, organization, and delivery, each scored on a 0–5 scale (total 15 points). Only the oral presentation scores were used to assess this ELO.
Key Findings for LAT 1	The average oral presentation score was 13.3 out of 15. A majority of students performed well: 5 students scored above 90%, 6 students above 80%, and 1 student above 70%. Most students delivered their presentations with clarity and confidence, effectively using visual aids and demonstrating strong verbal communication skills.
Description of how student performance for LAT 1 related to expectations for Standard 8 ELO 2	This ELO was well met. Students demonstrated proficient oral communication skills by effectively summarizing and presenting complex scientific content. The rubric results indicate that the majority of students met or exceeded performance expectations for this outcome.

Assessment	Results
Name of LAT 2	Oral presentation
Description of LAT 2	Eight students presented their product development projects to a group of fellow students and faculty.
Description of how LAT 2 was implemented with students	At the end of the fall semester, all students in the product development class gave a 15-minute presentation on their product idea to a group of faculty and students.
Description of the tool(s) used for LAT 2 analysis	The audience was asked to provide comments in terms of use of visual information, clarity of communication, and persuasiveness of the product pitch.
Key Findings for LAT 2	We did not use a formal scoring scheme to evaluate the student performance, which was an oversight. Nonetheless, an informal

	survey of faculty members after the presentations indicated there were no serious gaps in students understanding of the product development process.
Description of how student performance for LAT 2 related to expectations for Standard 8 ELO 2	In our evaluation, students performed well in this assignment. As product development is a capstone course, students must evaluate how all aspects of food science (i.e. chemistry, microbiology, engineering, sensory) are addressed in a novel product. Students were given individual feedback by audience members, to help them improve their presentation skills.

Assessment	Results
Standard	Food Science Communication
ELO assessed	Assemble food science information for a variety of audiences
Course ELO was assessed in	NFDS 3110
Period ELO was assessed	Fall 2021, 2022
Name of LAT 1	Pro and Con paper for food additives
Description of LAT 1	Students selected a food additive from a list of unacceptable additives listed from Whole Foods on their website. They then assembled three sources of information supporting the use of the ingredient, and three sources suggesting it should not be allowed. Then, students evaluated the scientific rigor of the sources, and synthesized the information into a 5-7-page term paper that was to be written for a lay audience.
Description of how LAT 1 was implemented with students	Twelve food science students completed this assignment over a 2-year period.

Description of the tool(s) used for LAT 1 analysis	Prior to the assignment, students were given an evaluation rubric that was used to grade the paper.
Key Findings for LAT 1	A 5-point rubric was developed to evaluate the effectiveness of the presentation of both sides of the debate to a lay audience (5-effectively communicates debate, 4-good communication, some room for improvement, 3-represents debate, 2-lack depth in presentation of debate, 1-poor communication of debate).
Description of how student performance for LAT 1 related to expectations for Standard 8 ELO 3	The average of the 12 food science students was 4.3. We find this acceptable, and would have no plans to adjust the assignment. However, this class is no longer offered to our undergraduates due to state regulations, and we will need to find a replacement assignment for the next assessment cycle.

Assessment	Results
Name of LAT 2	Class discussion Industry Guest Speaker
Description of LAT 2	Students are expected to write a report on the overall quality of the dairy foods prepared by them in the dairy processing lab. They need to write a report considering production, quality and technical salespeople. The report should have both scientific and commercial aspects which can be understood by marketing and salespeople.
Description of how LAT 2 was implemented with students	All 12 students participated in this activity in 4 groups, each group having 3 members in the group. Reports will have due date of seven days after the lab activity. Students are expected to have a classroom discussion on their viewpoints, followed by 5-6 page

	report on the topic. Reports will be evaluated for their completeness, grammar and vocabulary.
Description of the tool(s) used for LAT 2 analysis	Maximum marks for each report were assigned 20.0 A structured rubric assessed three categories: clarity, organization, and delivery. Credits for student participation were also given. Only the written report scores were used to assess this ELO.
Key Findings for LAT 2	The average score was 99.65 out of 100. The students performed exceedingly well in this LAT. All students participated very well in the class discussion and their written content was very much focused on the communication needs of other stakeholders.
Description of how student performance for LAT 2 related to expectations for Standard 8 ELO 3	The expectations for this ELO were well met. Students demonstrated proficient both in oral and written communication skills by effectively summarizing and presenting complex scientific content.
What could you do differently next year to further improve student performance on this standard?	We discuss assessments in our faculty meetings, and preparedness of students from earlier courses in our curriculum for later courses.