

2014 IFT Assessment Progress Report for 2013 -2014 Academic Year

Food Science Program: Utah State University

Coordinator: Robert E. Ward

Title: Associate Professor and Food Science Program Director

E-mail: robert.ward@usu.edu

Faculty who participated in the development or approval of this Assessment Progress Report:

Robert Ward, Silvana Martini, Don McMahon, Karin Allen, Marie Walsh, Jeff Broadbent, Dick Whittier, Chuck Carpenter

In the *Annual Assessment Report Summary and Feedback* document received from HERB on January 8th, 2014 the panel commended USU for efforts aimed at improving our progress reports, and pointed out specific ways USU should improve our annual assessment in the next two years before our 2016 accreditation application. For the course outcomes of 'student knowledge' the panel indicated the outcomes listed last year were too vague and that they should be written more specifically. It was suggested USU should use the IFT competencies as a guideline and refine them for the particular skill or knowledge that the student should possess at the end of the course. The panel also suggested the program should strive to use embedded assessments in courses rather than grades.

At the program level, the 2013-2014 plan included an assessment of critical thinking using technical writing assessment from the 2nd and 4th year of the program. The panel suggested the supplied rubric could be improved by being more fully developed to explain how points were awarded. In the 2013-2014 report program assessment was included which linked mapping of course objectives to USU's course evaluation program, IDEA. The panel pointed out that these data are not valuable for assessing learning outcomes and the efficacy of student teaching and learning, and suggested they should no longer be reported.

Based on the comments of the HERB panel, the planned assessment for student knowledge from last year was too vague. Thus, in its place we present an assessment of the learning outcomes for NDFS 5560, Food Chemistry that were included in our renewal application in 2011. Although we had not proposed to evaluate this course in last year's progress report, we are able to extract data on student performance using our online course content delivery system. Based on the HERB panel comments, this assessment is more in line with what has been requested. Following the reporting on the two assessments we made for the 2013-2014 academic year, we present a two year plan for 2014-2015 and 2015-2016 leading up to our renewal application.

I. COURSE LEARNING OUTCOME THAT WAS ADDRESSED IN THE 2013-2014 ACADEMIC YEAR

Outcome measured: In our 2011 renewal application, we proposed to address the IFT Core Competency 'Structure and properties of food components, including water, carbohydrates, protein, lipids, other nutrients and food

additives' in this course. More specifically, we listed the following three learning objectives....

Differentiate and describe, in chemical terms, key properties of intact cellular foods (fruits, vegetables, fresh meats) and processed foods (cheese, oils, breads).

Differentiate and describe the effects of heat, light, temperature, oxygen concentration, and enzymes on food properties (e.g., Maillard browning effects on color, mechanism of antioxidant action in oils or processed meats, pH effects on thiamine stability).

Explain effects of water activity, pH, temperature, oxygen concentration on food components.

Methods of Assessment: These learning objectives were measured directly by evaluating the performance on the final exam in the class. They were also measured indirectly by evaluation of student performance in a subsequent course, NDFS 5920, Food Product Development. In product development, the IFT Core Competency addressed is 'the ability to apply and incorporate the principles of food science in practical, real-world situations and problems.' The relevant learning outcome measured is to create a new food product and students 'must have an understanding of food ingredient functionality and how this functionality will be retained/changed during processing.' Thus, the performance of students in this class is contingent upon the acquisition of these skills in Food Chemistry.

In Food Chemistry, the assessment is made at level IV of Bloom's Taxonomy which is analysis of elements, relationships and organizational principles. In Food Product Development, the assessment is at level V, which is evaluation. Students are expected to defend judgments made about the food formulation and its behavior during processing.

Summary of key findings: In Food Chemistry, the final exam is comprehensive and there was one question focused on each of the three learning outcomes. One question probed the student analysis of the functionality of each ingredient in a processed food. A second question evaluated student knowledge the effects of temperature on a major food ingredient, and the third question related to shelf-life changes and lipid oxidation.

The final scores for the 2013-2014 final are shown in Figure 1.

From the data it is clear we have two distributions of students. One achieved an A- grade in the final, while the others achieved B- grades (or lower). This performance was consistent with other aspects of these students' work. Our A students are more adept at success skills such as writing, public speaking and time and project management. In our program we often have a cohort of students who are highly motivated and need little prompting to exert themselves, and a second which do only what they perceive as absolutely necessary.

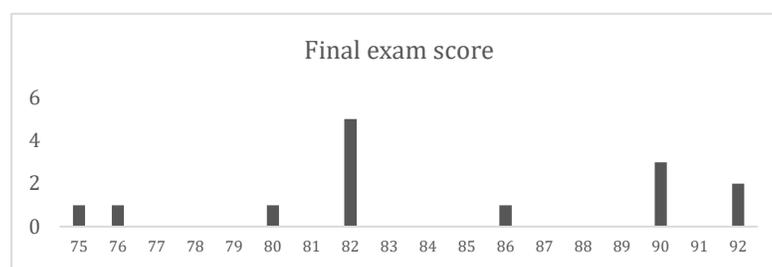


Figure 1: Student grade distribution in Food Chemistry Final

As we had not specifically planned to evaluate this course in 2013-2104, the indirect evaluation that was conducted in Food Product Evaluation is not quantitative. Nonetheless, it is clear that there is a disconnect in our teaching of core principles (like water activity) in Food Chemistry, and the functional knowledge our students have when they enroll in Food Product Development.

For example, of the eleven students enrolled in Food Product Development in 2013-2014, only one realized the importance of water activity, type of ingredients (generally hydrocolloids), processing conditions, and packaging on the shelf life (flavor, texture, off flavor development (rancidity)) and quality (sensory acceptance) of the food products created. Thus, despite the fact that we have a bimodal distribution of student performance in Food Chemistry, there is not a replicate distribution of performance in Food Product Development. It seems clear that this needs to be addressed.

II. Actions being taken as a result of the above In 2013-2014 Food Chemistry was taught for the first time by Dr. Ward after he inherited it from a professor who retired (Dr.

research findings. assessment Cornforth). The text used for this class has recently been Food Chemistry, Principles and Applications which is edited by Hui. Dr. Cornforth found that a commonly used text (Fennema) was too challenging for our students and found that the alternative text was more suitable. After teaching the course for the first time, Dr. Ward has expressed dissatisfaction with the Hui text. In a phone call last Spring, Dr. Ward discussed a new Food Chemistry text (Introductory Food Chemistry edited by John Brady) with HERB panel member Jeff Bohlscheid. Dr. Ward had received a trial copy in the mail and was pleased to find Dr. Brady's intention was to produce a book that was more approachable by current food science students than Fennema.

In 2014-2015 the course is being taught by Dr. Walsh, the teacher of Food Product Development while Dr. Ward is on sabbatical. Upon return from his sabbatical, Dr. Ward will work with Dr. Walsh to determine rearranging the curriculum of Food Chemistry to focus more on applications-based content delivery and laboratories. This discussion will involve the overall delivery of content, as well as the best text to use and level of depth used.

I. PROGRAM OUTCOME THAT WAS ADDRESSED IN THE 2013-2014 ACEDMIC YEARS

Outcome measured: Technical Writing/Critical Thinking

Methods of Assessment: NDFS 3110 (Food, Technology and Health) is taken in the sophomore year. This course contains a writing assignment in which students are tasked to address both sides of a controversial topic by assembling three pro and three con references and evaluating them for science merit.

NDFS 5560 (Food Chemistry) also contains a writing assignment on a food chemistry topic of the student's choice. There are clear guidelines given to students at the beginning of the semester regarding what topics are appropriate and at what depth the analysis is expected. A similar rubric to the one described above was used for this writing assignment.

Summary of key findings: NFDS 3110 is large, lecture course that is required of Food Science majors, but is also offered as a depth science course on the Utah State campus. It is a relatively large class (average 92 students), of which approximately 10% are Food Science. In NDFS 3110, the average paper grade was a low B, whereas the grades for Food Science students was a high B. From this we can gather that our students are better technical writers than the average student that takes this class. This may be because they are more motivated in a class that is required for them, however we do not know why. In the response to last year's progress report the HERB panel pointed out that the rubric we used to evaluate this writing project was too simplistic and we have since taken note of examples provided on the relevant IFT web page.

The writing project for NDFS 5560 was evaluated using a similar rubric. This class is primarily Food Science juniors, and there was a bimodal distribution of grades, like the exam example given above. One novel aspect of the grading in 2013-2014 is that Dr. Ward took advantage of a software program offered in our course delivery system that checks writing samples for originality. Each submitted sample is given a percent of text that is not original. Due to commonly used wording, the average for a student paper should be between 4 and 8% which is not original. Using this software we found that about 10% of the students in the class were liberally borrowing phrases and wording from their sources without direct quotations. At the time a lecture was given on plagiarism and students were also given an assignment to complete to make sure they could be held accountable for such transgressions in the future.

II. Actions being taken as a result of the above research assessment findings. We would agree that the rubric used to evaluate writing in 2013-2014 could be improved upon, and we will consult the provided examples to prepare a new one the next time writing is evaluated.

We have struggled with the value of NDFS 3110 in our curriculum. As mentioned above, it is offered across campus, and the original intent was to attract students to our program. However, as the non-Food Science students who take this course are typically

juniors and seniors, it does not effectively help us recruit. In a faculty meeting before the start of the 2014-2015 academic year we have agreed to rethink our curriculum in the first two years to allow us to better attract students, and to avoid using our resources to teach students who we have little chance to recruit.

In NDFS 5560 we found that a non trivial percentage of our students were unclear as the specific definition of plagiarism. All of our faculty have been made aware of this, and we are working on making sure this is presented to students early in their time in our department.

The HERB panel suggested we use a more detailed rubric for evaluating technical writing. In future evaluations of success skills, and in other relevant areas, we use more powerful rubrics.

Two year plan

Our re-approval application will be submitted in 2016, and thus we have two years left in our current approval term. Our two year plan includes the following:

1. In the 2014-2015 academic year a course evaluation will be conducted for NDFS 5100 (Food Sensory Science). In addition, a program level evaluation of two success skills will be evaluated using a combination of direct and indirect measures. These are *Time management/ project management* and *Interaction/interpersonal skills*.
2. In the 2015-2016 academic year, a course evaluation will be conducted for NDFS 5110 (Food Microbiology), and for NDFS 4400 (Food Engineering). In addition, a program level evaluation of the success skill *Critical Thinking* will be conducted.
3. In the remaining two years of our current IFT approval, we will continue to work with the Office of Analysis, Assessment and Accreditation to develop and write effective program and course learning outcome assessments.

Following this plan, we will address all four areas of the Core Competencies (see below) from 2013-2014 to 2015-2016. In addition, we address many of the IFT success skills (also see below). This will give us important data to use in reformatting our curriculum prior to our reaccreditation application.

	2013-2014	2014-2015	2015-2016
IFT Core Competencies (courses)			
Food Chemistry and Analysis	5560		

Food Safety and Microbiology		5110
Food Processing and Engineering		4400
Applied Food Science	5100	

IFT Success skills

Communication skills	√	
Critical thinking/ problem solving skills	√	
Professionalism skills (ethics, integrity)		
Lifelong learning skills		
Interaction/interpersonal skills	√	
Information acquisition skills		√
Organizational skills (time management and project management)	√	
