Term Information

Effective Term	Autumn 2022
Previous Value	*Spring 2017*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

Update prerequisites and exclusions; update learning outcomes; add GE theme (health and wellbeing)

What is the rationale for the proposed change(s)?

There is a need to update to semester course numbers in the prerequisites/exclusions and to delineate ELOs for the existing goals. There is a need to add in the new Health and Wellbeing GE Theme goals and ELOs.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

There are no programmatic implications of the proposed changes.

Is approval of the requrest contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Food Science & Technology
Fiscal Unit/Academic Org	Food Science & Technology - D1156
College/Academic Group	Food, Agric & Environ Science
Level/Career	Undergraduate
Course Number/Catalog	2400
Course Title	Introduction to Food Processing
Transcript Abbreviation	Intro Food Proces
Course Description	Introductory class applying chemistry, biology, and engineering to hands-on experience on the production and evaluation of foods. Includes basic food regulations, sanitation and formulation.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Laboratory, Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus, Lima, Mansfield, Marion, Newark, Wooster
Previous Value	*Columbus*

Prerequisites and Exclusions

Prerequisites/Corequisites	BIOLOGY 1101 or 1113; and CHEM 1110 or 1210; or Permission of Instructor
Previous Value	*Prereq: Biology 1101 (101) or 1113 (113), and Chem 1110 (101) or 1210 (121).*
Exclusions	Not open to students with credit for 1401.
Previous Value	Not open to students with credit for 401.
Electronically Enforced	Yes
Previous Value	**No**

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	01.1001
Subsidy Level	Baccalaureate Course
Intended Rank	Sophomore, Junior, Senior

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Health and Well-being

The course is an elective (for this or other units) or is a service course for other units

Previous Value

Required for this unit's degrees, majors, and/or minors

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Students will have an overall view of the complex food matrix, and the multiple disciplines associated with food science
- Gain familiarity with basic principles of various food-processing methods.
- Students will have a general understanding of the practices for food sanitation and waste management as well as an overall view of the regulations that govern the food supply, use of food additives and food colorants.
- Students will have an understanding of the basics of the chemical components and main chemical reactions that are responsible for the quality and attributes of a food product.
- Students will learn the unit operations required to make foods, and the processes or ingredients required to make the product safe and the impact that microorganisms can have in a food product, both desirable and undesirable.
- 1D. Understand the formulation and processing of foods and the basic chemistry of the components.
- 2D. Understand the government regulatory framework required for manufacture and sale of food in the US.
- 3D. Be familiar with processing plant equipment and practices.
- 4D. Given a food product: Name the unit operations required to make it; Describe the processes and/or ingredients needed to make it safe; Describe the major quality attributes and the factors that affect them; Describe several objective measurements

Previous Value

- *Students will have an overall view of the complex food matrix, and the multiple disciplines associated with food science*
- *Gain familiarity with basic principles of various food-processing methods.*
- *Students will have a general understanding of the practices for food sanitation and waste management as well as an overall view of the regulations that govern the food supply, use of food additives and food colorants.*
- *Students will have an understanding of the basics of the chemical components and main chemical reactions that are responsible for the quality and attributes of a food product.*
- *Students will learn the unit operations required to make foods, and the processes or ingredients required to make the product safe and the impact that microorganisms can have in a food product, both desirable and undesirable.*

Content Topic List

- Introduction: what did you eat today?
- How do we process foods? Why do we process foods?
- The importance of food processing – foods are perishable
- Unit operations and unit processes
- Aseptic processing
- Principles of food chemistry
- Measurement of food quality: instrumental and sensory analyses of foods
- Friendly microorganisms and fermentation
- Dangerous microorganisms
- Methods of food preservation - Absolute barriers
- Methods of food preservation - partial barriers
- Food regulations and sanitation

Sought Concurrence

No

Attachments

- 2400 Syllabus Health GE AU 22_11-30.docx: Syllabus

  (Syllabus. Owner: Davis,Molly Jane)

- submission-healthwellbeing fst 2400_11-30.pdf: GE Theme Submission

  (Other Supporting Documentation. Owner: Davis,Molly Jane)

- FDSCTE 2400 Responses to ASC Panel Recommendations.docx: Response to Requests

  (Other Supporting Documentation. Owner: Davis,Molly Jane)

Comments

- Attach Response

  Revise as per COAA via email 22 July 2021

  Revise as per email message 9 July 2021 *(by Osborne,Jeanne Marie on 12/01/2021 12:03 PM)*

- Please see Panel feedback email sent 10/08/2021. *(by Hilty,Michael on 10/08/2021 01:03 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Davis,Molly Jane	06/30/2021 03:42 PM	Submitted for Approval
Approved	Rodriguez-Saona,Luis Enrique	06/30/2021 03:51 PM	Unit Approval
Revision Requested	Osborne,Jeanne Marie	07/09/2021 12:48 PM	College Approval
Submitted	Davis,Molly Jane	07/13/2021 10:03 AM	Submitted for Approval
Approved	Rodriguez-Saona,Luis Enrique	07/13/2021 11:20 AM	Unit Approval
Revision Requested	Osborne,Jeanne Marie	07/22/2021 03:03 PM	College Approval
Submitted	Davis,Molly Jane	07/26/2021 12:29 PM	Submitted for Approval
Revision Requested	Osborne,Jeanne Marie	07/27/2021 02:35 PM	Unit Approval
Submitted	Davis,Molly Jane	07/27/2021 03:13 PM	Submitted for Approval
Approved	Rodriguez-Saona,Luis Enrique	07/28/2021 10:23 AM	Unit Approval
Approved	Osborne,Jeanne Marie	07/28/2021 10:29 AM	College Approval
Revision Requested	Hilty,Michael	10/08/2021 01:03 PM	ASCCAO Approval
Submitted	Davis,Molly Jane	11/30/2021 11:58 AM	Submitted for Approval
Revision Requested	Osborne,Jeanne Marie	12/01/2021 12:03 PM	Unit Approval
Submitted	Davis,Molly Jane	12/01/2021 12:06 PM	Submitted for Approval
Approved	Rodriguez-Saona,Luis Enrique	12/01/2021 12:10 PM	Unit Approval
Approved	Osborne,Jeanne Marie	12/01/2021 02:13 PM	College Approval
Pending Approval	Cody,Emily Kathryn Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	12/01/2021 02:14 PM	ASCCAO Approval

Introduction to Food Processing Syllabus

FDSCTE 2400 Autumn 2022

Course Information

- **Course times and location:** Tuesdays and Thursdays, 10:20 a.m.-11:15 a.m. and one 3-hour lab on Wednesdays, 8:00 a.m.-10:45 a.m., 11:00 a.m.- 1:45 p.m. OR 2:00 p.m.-4:45 p.m.
- **Credit hours:** 3 credit hours
- **Mode of delivery:** In-Person

Instructor

- **Name:** Mary Kay Pohlschneider, Ph.D.
- **Email:** pohlschneider.1@osu.edu
- **Phone Number:** 614-292-3867
- **Office location:** 214 B Howlett Hall

- **Office hours:** by appointment, in-person
- **Preferred means of communication:**
  - My preferred method of communication for questions is **email.**
  - My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Lab Coordinators

- **Matt Chrusciel**
  - Parker Teaching labs
  - **Email:** Chrusciel.3@osu.edu
- **Gary Wenneker**
  - Dairy Pilot Plant
    - **Email:** Wenneker.1@osu.edu

- **Matt Papic**
  - Howlett Fruit and Vegetable Plant
  - **Email:** Papic.1@osu.edu

- **Dr. Lynn Knipe**
  - Meat Lab
  - **Email:** Knipe.1@osu.edu
  - **Office:** 327 Parker

Course Prerequisites

BIOLOGY 1101 or 1113; and CHEM 1110 or 1210; or Permission of Instructor

This course requires that a student have a foundation in biology and chemistry. To that end, Biology 1101 and Chemistry 1110 or a higher level are required. Taking these courses concurrently is allowed with instructor permission.

Course Description

This is an introductory class applying chemistry, biology, and engineering to hands-on experience on the production and evaluation of foods. Includes basic food regulations, sanitation, and formulation.

The course consists of two lectures and one 3-hour laboratory per week. Attendance and participation are mandatory, though accommodations will be made if you have an objection or allergy to specific foods. **Please make the instructor aware of such needs.** FST 2400 is a "hands on" course with team-based projects. **Attendance is required.** Excused absences **require documentation** and include those caused by illness, family death, and official university function. Unexcused absences will not be allowed to be made up resulting in a zero grade for all assignments connected to that day's work or tests that may have been missed.

Topics

Topics for this course include:

- Introduction: what did you eat today?
- How do we process foods? Why do we process foods?
- The importance of food processing – foods are perishable
- Unit operations and unit processes
- Aseptic processing

- Principles of food chemistry
- Measurement of food quality: instrumental and sensory analyses of foods
- Friendly microorganisms and fermentation
- Dangerous microorganisms
- Methods of food preservation - Absolute barriers
- Methods of food preservation - partial barriers
- Food regulations and sanitation

Course Goals

Through the course topics and the learning activities of this course, students will:

- Have an overall view of the complex food matrix, and the multiple disciplines associated with food science.
- Gain familiarity with basic principles of various food-processing methods.
- Have a general understanding of the practices for food sanitation and waste management as well as an overall view of the regulations that govern the food supply, use of food additives and food colorants.
- Have an understanding of the basics of the chemical components and main chemical reactions that are responsible for the quality and attributes of a food product.
- Learn the unit operations required to make foods, and the processes or ingredients required to make the product safe and the impact that microorganisms can have in a food product, both desirable and undesirable.

Course Learning Outcomes

By the end of this course, students should successfully be able to:

1D. Understand the formulation and processing of foods and the basic chemistry of the components.

2D. Understand the government regulatory framework required for manufacture and sale of food in the US.

3D. Operate pilot processing plant equipment safely and follow appropriate Good Manufacturing Practices while in pilot plant laboratories.

4D. Given a food product:

i. Name the unit operations required to make the product.

ii. Describe the processes and/or ingredients needed to make the product safe.

iii. Describe the major quality attributes of the product and the factors that affect them.

iv. Describe several objective measurements of food quality.

v. Discuss the psychological and physiological basis for appropriate sensory analysis.

General Education Expected Learning Outcomes

As part of the Health and Wellbeing Theme of the General Education curriculum, this course is designed to prepare students to be able to do the following:

General:

- Analyze an important topic or idea at a more advanced and in-depth level than the foundations.
- Integrate approaches to the theme by making connections to out-of-the classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in the future.

Health and Wellbeing:

- Explore and analyze health and wellbeing through attention to at least two dimensions of wellbeing.

The GE Learning Objectives that will be assessed in this course include:

General:

1.1G Engage in critical and logical thinking about the topic or idea of the theme.

1.2G Engage in an advanced, in-depth, scholarly exploration of the topic or idea of the theme.

2.1G Identify, describe, and synthesize approaches or experiences as they apply to the theme.

2.2G Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.

Health and Wellbeing:

1.1H Explore and analyze health and wellbeing from theoretical, socio-economic, scientific, historical, cultural, technological, policy, and/or personal perspectives.

1.2H Identify, reflect on, and apply the skills needed for resiliency and wellbeing.

Through this course, students will fulfill these learning outcomes by:

- Examining how the natural sciences apply to food. Students will engage in critical thinking and in-depth exploration of food chemistry and food safety, which directly apply

to the theme of health and wellbeing, particularly the physical, scientific, career, and personal experiences of health.

- Participating in lab activities will provide students the opportunity to develop a sense of self as a learner by applying knowledge from prior experiences, other classes, and the information derived from the activities to real-world food production.
- Through food safety and career skills students will explore and analyze their own physical and career health and wellbeing and personal perspectives.
- Resiliency is built through troubleshooting and critical thinking in lab activities. These activities provide real-world experiences that build resiliency and problem solving for future careers.

This is a technically driven course; however, it is also foundational, and the skills covered are broadly applicable to anyone preparing food. This course builds on prior experiences both scientifically as well as common kitchen and play experiences, such as mixing ingredients and cutting dough shapes. The material develops the students' sense of self as a learner with lab experiences that challenge their prior knowledge and allow them to apply these ideas to productive activities that will build their knowledge of physical, scientific, and career health and wellbeing.

How This Course Works

Mode of delivery: This course is an in-person course.

Credit hours and work expectations: This is a 3-credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credit hours), students should expect around 2 hours per week of time spent on direct lecture instruction (instructor content and activities, for example), up to 3 hours of direct lab instruction or activities, in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of C average.

Attendance and participation requirements: Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **Lecture attendance** is not calculated into your grade; however, attendance is strongly recommended unless other accommodations are made. Contact the instructor if you are unable to attend class.
- **Lab attendance is mandatory**. If you are not able to attend your registered lab section, the first accommodation is to attend another section that day. Otherwise, you will need to make arrangements with the instructor as to how you will be able to make-up that week's work in the case of documented illness or emergency. Contact the instructor as soon as possible, and accommodations may be made at the discretion of the instructor (more detail is provided on page 2 of this syllabus).

Course Materials, Fees and Technologies

Required Materials

- There is no required textbook.
- Students must purchase a lab coat for this course. Ideally it should be thigh length,however, if you already own a waist-length coat, that is acceptable.

Recommended/Optional Material

- Current journal and trade publications will be posted on CarmenCanvas for additional reading on the course material.
- Potter NN, Hotchkiss JH. 1998. *Food Science* 5th Ed. Springer. New York. http://link.springer.com/book/10.1007%2F978-1-4615-4985-7
    - While the textbook is not required, some students find that reading is a good learning method. I highly encourage students to use this textbook as a supplement to the course material.
    - This resource can be downloaded as a PDF for free on campus.

Required Equipment

- **Computer:** current Mac (MacOS) or PC (Windows 10) with high-speed internet connection.
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access (go.osu.edu/student-tech-access).

Required Software

Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Visit the installing Office 365 (go.osu.edu/office365help) help article for full instructions.

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes, good for 365 days, that can each be used once.
- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- Navigating CarmenCanvas (go.osu.edu/canvasstudent)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Grading and Faculty Response

How Your Grade is Calculated

Assignment Category	Points
Quizzes 5 for 75 points each	375
Final	200
Pre-lab summaries 14 for 5 points each	70
Lab Worksheets 12 for 15 points each	180
Formulation HW	20
Executive Summaries 2 for 45 points each	90
Group Project:	
Variable	10
Formulation	30
Planning Worksheet	75
Sanitation Standard Operating Procedures (SSOP) and Hazard Analysis Critical Control Points (HACCP) plan	75
Report	75
Presentation	50
Peer Evaluation	50
CLASS TOTAL	1300

See Course Schedule for due dates.

Descriptions of Major Course Assignments

Quizzes and Final

Description: Tests will be multiple choice and short answer questions. They will be proctored online using Proctorio and must be taken during the assigned class time. A paper version will be available, and arrangements will be made for in-person testing with the instructor. The quizzes will be over lecture material for each section, not cumulative. The final will be cumulative. All test questions will be graded for correctness and accuracy in answering the given question. Partial credit can be awarded on most short answer questions.

Academic integrity and collaboration: It is expected that all tests be completed independently without the use of notes, books, or any other materials.

Pre-lab Summaries

Description: Prior to each unit operation lab and some of the processing labs students are required to create a submission that demonstrates understanding of the procedure or other documents as directed (such as sensory forms or teamwork assignments). These submissions should answer the questions posed in the assignment, but it is not required that the questions be answered in a linear format. Pictures/flowcharts and other creative methods are encouraged. Pre-labs will be graded on completion.

Academic integrity and collaboration: Students are expected to submit their own original pre-labs. However, consulting with other students is acceptable. The pre-labs for the group project are to be completed by everyone in the group working together, but only one student should submit.

Lab Worksheets and Formulation Homework

Description: Each unit operation lab includes a Word document worksheet. Students are expected to fill out the worksheet and submit as a Word document or PDF. The formulation homework is explained on CarmenCanvas and will be demonstrated in class. These will be graded on correctness and accuracy in answering the questions and reporting the lab results.

Academic integrity and collaboration: Students are expected to submit their own original work. However, consulting with other students is acceptable.

Executive Summaries

Description: These summaries will be written about processing and evaluations. They follow the 6-paragraph format of Introduction, test results 1, test results 2, test results 3, sensory

results, conclusion. Executive summaries will be graded on completion, and adherence to format direction.

Academic integrity and collaboration: Your written assignments must be your own original work. You are encouraged to ask a trusted person to proofread your assignments before you turn them in but no one else should revise or rewrite your work.

Group Project Assignments

Description:

- **Variable:** once a product has been decided the group will submit ideas to use as a variable. Graded on completion.
- **Formulation:** Using the same spreadsheet as the formula homework, each group will create a formula for their product. That information will then be transferred to a second page that accounts for the variable and 3 batches. Will be corrected and groups may be asked to revise but graded on completion.
- **Planning Worksheet:** This document helps the group walk through the needed ingredients, equipment and processing methods for their product processing and evaluations. Will be corrected and groups may be asked to revise but graded on completion.
- **Sanitation Standard Operating Procedures (SSOP) and Hazard Analysis Critical Control Points (HACCP) plan:** Groups will work together to create a sanitation plan and HACCP plan to ensure safe processing of their products. Students will use the recordkeeping forms created during processing. Will be corrected and groups may be asked to revise but graded on completion.
- **Report:** This report will follow the Journal of Food Science format and rubric given in the course material. It will be graded on completion and accuracy.
- **Presentation:** Groups will be required to submit a slide deck presentation using a program of their choice. The presentation should follow the Executive Summary format. Only one presentation per group. Each individual is required to present to the class an equitable portion of the presentation. Grades for presentation will be individual, based on knowledgeable presentation and answering questions as well as participation in asking other groups questions.
- **Peer Evaluation:** Completed individually, this is a method for groupmates to evaluate each other. An individual's grade will be an average of their group's scores for them. When there are widely disparate scores the instructor will evaluate contributions and award points objectively.

Academic integrity and collaboration: All group project assignments are intended to be a group effort. All members must contribute equally to all assignments. Each assignment should be the original work of the group members. In all cases except the peer-evaluation only one student needs to submit each assignment. (Peer-Evals are an individual assignment).

The report should contain references which should be cited using Journal of Food Science standards.

Late Assignments

Please refer to Carmen for due dates. Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. For unexplained tardiness, a deduction of 10% per 24 hours late will be assessed, however, many times students need further assistance with their assignments and after lab or class is the best time for that instruction. If that is the case, and an assignment cannot be submitted by the given deadline, my priority is that you understand the questions and have time to properly correct/complete the assignment. A penalty will not be assessed unless the assignment is tardy after the agreed upon deadline, when it will be assessed the same deductions as listed above.

Instructor Feedback and Response Time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **24 hours on days when class is in session at the university**.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For assignments submitted before the due date, I will try to provide feedback and grades within **seven days**. Assignments submitted after the due date may have reduced feedback and grades may take longer to be posted.

Grading Scale

93–100: A
90–92.9: A-
87–89.9: B+
83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70–72.9: C-
67–69.9: D+
60–66.9: D
Below 60: E

Other Course Policies

Discussion and Communication Guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style**: While there is no need to complete basic assignments like the pre-labs as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for assignments other than the final report.
- **Tone and civility**: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources**: When you use resources outside of the class material, please cite your sources. Just a link for online sources is adequate except for the report – that should follow the full Journal of Food Science standards given in the modules.

Proctorio

- Proctorio, an online proctoring tool, may be used during this course. Proctorio offers you flexibility to take your exams at the time and in the location of your choosing. Students are required to have a webcam (USB or internal) with a microphone and a strong and stable internet connection. During the course of an exam, Proctorio will record the testing environment, therefore students should select private spaces for the exam session where disruptions are unlikely and where recording devices can be enabled. Instructions for installing Proctorio use will be provided. To use Proctorio you must be **over 18 years of age**. (Please contact the Instructor if under 18.) Additionally, the tool has **limitations in its accessibility** for students reliant upon screen readers and keyboard navigation. Additional information on academic integrity at Ohio State and recommended proctoring options is available.
- Students will be given the opportunity and encouraged to take a sample practice quiz with Proctorio before an examination for credit is deployed. This will ensure that the entire class, including those with accessibility concerns, will be ready to use Proctorio or have an alternative in place.

Academic Integrity Policy

See Descriptions of Major Course Assignments for specific guidelines about collaboration and academic integrity in the context of this online class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's Code of Student Conduct (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.
If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)
- Eight Cardinal Rules of Academic Integrity (go.osu.edu/cardinal-rules)

Copyright for Instructional Materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or Email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member."

This course adheres to The Principles of Community adopted by the College of Food, Agricultural, and Environmental Sciences. These principles are located on the Carmen site for this course; and can also be found at https://go.osu.edu/principlesofcommunity. For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (https://equityandinclusion.cfaes.ohio-state.edu/). If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) at https://studentlife.osu.edu/bias/report-a-bias-incident.aspx.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand mental health resources (go.osu.edu/ccsondemand) are available. You can reach an on-call counselor when CCS is closed at 614- 292-5766**. 24-hour emergency help** is available through the National Suicide Prevention Lifeline website (suicidepreventionlifeline.org) or by calling 1-800-273-8255(TALK). The Ohio State Wellness app (go.osu.edu/wellnessapp) is also a great resource.

David Wirt, wirt.9@osu.edu, is the CFAES embedded mental health counselor. He is available for new consultations and to establish routine care. To schedule with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

Accessibility Accommodations for Students with Disabilities

Requesting Accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services (SLDS). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services.

Disability Services Contact Information

- Phone: 614-292-3307
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: Baker Hall 098, 113 W. 12th Avenue

Accessibility of Course Technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations as early as possible.

- CarmenCanvas accessibility (go.osu.edu/canvas-accessibility)
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)

UNIVERSITY RESOURCES

Grievances: According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor or professor. Then, if necessary, take your case to the department chairperson, college dean or associate dean, and to the provost, in that order. Specific procedures are outlined in Faculty Rule 3335-7-23. Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

Trigger Warning: While I do not anticipate any triggering content in this course, if needed, please take care of yourself while watching/reading the material (take a break, debriefing with a friend, contacting a Sexual Violence Support Coordinator at 614-292-1111 or Counseling and Consultation Services at 614-292-5766, and contacting the instructor if needed). Expectations are that we all will be respectful of our classmates while consuming media. Failure to show respect to each other may result in dismissal from the class.

Lyft Ride Smart at Ohio State: Lyft Ride Smart at Ohio State offers eligible students discounted rides, inside the university-designated service area, from 9 p.m. to 3 a.m. Each month, 10,000 discounted rides will be made available on a first-come, first-served basis with the average cost expected to be $2 or less. Prices may be impacted by distance, traffic, time of day, special events and prime time surcharges. To qualify for program discounts, users must select "shared ride" when booking in the Lyft app. When using ride sharing, remember to visually confirm vehicle info/descriptions in the company app and ask the driver to say who they are picking up.

Course Schedule

The topics listed on pages 2 -3 will be divided up into the following five sections:

Refer to the CarmenCanvas course for up-to-date due dates.

Course schedule

Class	Topics	Additional Reading: Potter and Hotchkiss Food Science
1	Introduction Attributes and evaluations	Ch. 5 pp 69-89
2	Fluid Flow, Mixing and Size Adjustment	
3	Heat Transfer, Mass Transfer and Separation	
4	Unit Processes	Ch. 6 pp 90-112
5	QUIZ 1	
6	Food Chemistry - Carbohydrates	Ch. 3 pp 24-30
7	Food Chemistry – Protein	Ch. 3 pp 30-33
8	Food Chemistry – Fats	Ch. 3 pp 33-34
9	Food Chemistry – Water and more	Ch. 3 pp 35-45
10	QUIZ 2	
11	Food Deterioration (Intro HW)	Ch. 7 pp 113-137
12	Food Preservation, Hurdle Concept and Preservatives and Other Processing Techniques	Ch. 11 pp 245-263
13	Packaging (HW spreadsheet due)	Ch. 21 pp 478-513
14	Removing Heat	Ch. 9 pp 163-199
15	Adding Heat	Ch. 8 pp 138-162
16	A_w and pH	Ch. 10 pp 200-244; Ch. 12 pp 264-278
17	QUIZ 3	
18	Food Safety and Inspection	Ch. 23 pp 532-558
19	Sanitation	
20	HACCP	Ch. 22 pp 514-530
21	Sanitation and HACCP exercise	
22	QUIZ 4	
23	Laws (SSOP and HACCP plan due)	

24	**Labeling**	**Ch. 4 pp 46-68**
25	**Thanksgiving Break**	
26		
27	**Project processing (no class – Lab)**	
28	**QUIZ 5**	
29	**Review for Final and Evaluations**	

Week	Lab
1	Introductions, Lab safety
2	Size Adjustment Shredding/Chopping AND Mixing Dough
3	Size Adjustment Meat Grinding AND Fluid Flow Injecting
4	Separation Cream AND Fluid Flow Dairy **(Select products)**
5	Separation Sifting AND Heat Transfer Cooling
6	Mass Transfer Evaporation AND Heat Transfer Heating **(Variable due)**
7	Mass Transfer Pickles AND Mixing Ingredients
8	Demo Processing 1
9	Demo Processing 2 **(Formulation due)**
10	Evaluate products
11	Demo Processing 3 **(Planning worksheet due)**
12	Evaluate products
13	Project processing
14	Project Evaluation
15	Presentations **(Report due)**

November 11, 2021

Dear ASC Curriculum Committee,

We thank the Health and Wellbeing Theme Panel of the ASC Curriculum Committee for reviewing FDSCTE2400 (3-credit lecture/lab). The panel provided excellent advice and insight about our course for the new GE.

The panel listed 8 items that they would like us to address (shown in black-colored font below). Below we list these eight items and the actions (shown in green font) that we took to address these concerns.

Based on the panel's recommendations, we revised the syllabi for FDSCTE 2400. We believe that we have adequately addressed all the committee's concerns listed below and in the syllabi. If the committee has additional concerns or questions, please let us know so we can keep working on these items until the committee is fully satisfied.

Sincerely,

Department of Food Science and Technology

On Friday, October 8, the Health and Wellbeing Theme Panel of the ASC Curriculum Committee reviewed a course change proposal for ENR 2100 and 2101. The Panel did not vote on the proposal and would like the following 8 items addressed:

1. The reviewing faculty request further information about how resiliency (ELO 1.2 under Goal: Students will explore and analyze health and wellbeing through attention to at least two dimensions of wellbeing. [Ex: physical, mental, emotional, career, environmental, spiritual, intellectual, creative, financial, etc.]) is handled within the course, as they currently do not find much evidence for how this element is incorporated within the course in either the syllabus or Theme submission forms. Details regarding the resiliency component have been added to the Theme document. Students will develop resiliency through laboratory activities. Students will use the scientific method to plan, carry out, and review experiments in the labs. During their follow-up reviews, worksheets, executive summaries ,and lab reports, the students will need to examine their hypotheses and explain their data. As in real life, in many cases, the results will not be expected because of human error as these are novice learners. Students will have to troubleshoot and critically think about their methods and materials to improve on the results. This will begin with low-stakes follow-up assignments (lab worksheets), and will culminate with a higher-stakes final lab report. By offering multiple opportunities for students to identify and reflect on

their results and to devise ways to improve, students will develop the strategies for resiliency that that they will need in their everyday lives and in food science careers.

2. The reviewing faculty ask for further specificity in the learning outcomes for the course regarding how this course satisfies the Health and Wellbeing ELOs.
   Details have been added to the syllabus to specify how the learning outcomes satisfy the Health and Wellbeing ELOs; specifically:
   Through this course, students will fulfill these learning outcomes by:
   - Examining how the natural sciences apply to food. Students will engage in critical thinking and in-depth exploration of food chemistry and food safety, which directly apply to the theme of health and wellbeing, particularly the physical, scientific, career, and personal experiences of health.
   - Participating in lab activities will provide students the opportunity to develop a sense of self as a learner by applying knowledge from prior experiences, other classes, and the information derived from the activities to real-world food production.
   - Through food safety and career skills students will explore and analyze their own physical and career health and wellbeing and personal perspectives.
   - Resiliency is built through troubleshooting and critical thinking in lab activities. These activities provide real-world experiences that build resiliency and problem solving for future careers.

3. The reviewing faculty request a more explicit connection between Health and Wellbeing and the course material, as they are concerned that this extremely technically-driven course may not offer students enough chances to connect with the Health and Wellbeing Goal and ELOs.
   We made many revisions to the GE Theme document to better explain the connections between the Health and Wellbeing theme and the course material. While this is a technically driven course, the role of food safety in physical health is addressed throughout the course. Students outside the Food Science majors will be able to apply these concepts in their lives when selecting healthy foods and when cooking in their home kitchens.

4. The reviewing faculty request that discipline-specific acronyms be defined within the syllabus (such as SSOP and HAACP) because this course will be offered to students outside the discipline and they may not know what these stand for.
   We revised the text so that these acronyms are defined at first use.

5. The optional textbook for the course was published in 1998, and the reviewing faculty have concerns that this material is too outdated to be of use to students within the course.
This textbook is a widely used text that provides concrete foundational knowledge on food science. The instructor feels that this optional text is the best fit for the class, especially since it is available as a free download, which reduces costs to the student. To address the need for more current readings, the syllabus has been revised to note that current journal articles and trade publications will be posted on CarmenCanvas as additional reading material.

6. The reviewing faculty ask that further connection to Health and Wellbeing be applied to the General Theme ELOs, as they struggle to see the connection between the ELOs and the Theme in both the Theme submission forms and the course syllabus.
We made many revisions to the GE Theme document and the syllabus to better explain the connections between the Health and Wellbeing theme and the course material. Specifically, we noted that students will understand what makes a food safe and what is necessary during food production to ensure that safe food reaches customers. This study deepens their understanding and ability to make their own food safe, thus increasing their own physical wellbeing. Students will also be introduced to regulations that govern the food supply, use of food additives, and food colorants (policy related to public health). Students will also gain potential career skills, addressing the career aspect of health.

7. The reviewing faculty request that the course calendar (as found on page 19 of the syllabus) be further fleshed out and include a class-by-class and day-by-day breakdown of what students will be doing within the course.
The course calendar has been updated to include a day-by-day breakdown of what each class and laboratory will cover.

8. The reviewing faculty ask the Department to consider that this course will be offered as part of the new GE program and to consider students outside of their majors. They are concerned this course is too technical in nature for a GE course and does not offer sufficient time for reflection upon the GE category.
This is a technically driven course; however, it is also foundational, and the skills covered are broadly applicable to anyone preparing food. This course builds on prior experiences both scientifically (biology, chemistry) as well as common kitchen and play experiences, such as mixing ingredients and cutting dough shapes. The material develops the students' sense of self as a learner with lab experiences that challenge their prior knowledge and allow them to apply these ideas to productive activities that will build their knowledge of physical, scientific, and career health and wellbeing.

GE THEME COURSES

Overview

Courses that are accepted into the General Education (GE) Themes must meet two sets of Expected Learning Outcomes (ELOs): those common for all GE Themes and one set specific to the content of the Theme. This form begins with the criteria common to all themes and has expandable sections relating to each specific theme.

A course may be accepted into more than one Theme if the ELOs for each theme are met. Courses seeing approval for multiple Themes will complete a submission document for each theme. Courses seeking approval as a 4-credit, Integrative Practices course need to complete a similar submission form for the chosen practice. It may be helpful to consult your Director of Undergraduate Studies or appropriate support staff person as you develop and submit your course.

Please enter text in the boxes to describe how your class will meet the ELOs of the Theme to which it applies. Please use language that is clear and concise and that colleagues outside of your discipline will be able to follow. You are encouraged to refer specifically to the syllabus submitted for the course, since the reviewers will also have that document Because this document will be used in the course review and approval process, you should be *as specific as possible*, listing concrete activities, specific theories, names of scholars, titles of textbooks etc.

Accessibility

If you have a disability and have trouble accessing this document or need to receive it in another format, please reach out to Meg Daly at daly.66@osu.edu or call 614-247-8412.

Course subject & number FDSCTE 2400

General Expectations of All Themes

GOAL 1: Successful students will analyze an important topic or idea at a more advanced and in-depth level than the foundations.

Please briefly identify the ways in which this course represents an advanced study of the focal theme. In this context, "advanced" refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities. *(50-500 words)*

In this class, students will analyze health and wellbeing as it relates to food and the processing of food. They will engage in scholarly activities that will advance their understanding of natural sciences through the in-depth study of the basics of food processing. In connection to the theme, students will understand what makes a food safe and what is necessary during food production to ensure that safe food reaches customers. This study also deepens their understanding and ability to make their own food safe, thus increasing their own physical wellbeing. The course also prepares them for a rewarding career, advancing their career wellbeing. Students will deeply engage with fundamentals of food processing, components of which they likely have been doing since toddlers (mixing, cutting dough shapes, etc.), but with the eye of engaging those concepts as a scientist.

Course subject & number FDSCTE2400

ELO 1.1 Engage in critical and logical thinking about the topic or idea of the theme. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

In this course, students will engage in critical and logical thinking about health and wellbeing (specifically the dimensions of physical and career wellbeing) centered around the production of safe foods and exploration of careers in Food Science. The corresponding goals listed on the syllabus are, "Students will have an overall view of the complex food matrix and the multiple disciplines associated with food science", and "Students will learn... the processes or ingredients required to make the product safe and the impact that microorganisms can have in a food product...".

In most lab activities, food will be made and analyzed using industry-specific equipment. These activities directly teach students skills necessary for careers in food processing and for producing safe food in their own homes. In later lab activities (weeks 10-15), students will learn about the sensory aspects of food science and creating sensory tests for their own products, both of which require students to engage in critical and logical thinking. Students further engage in critical thinking about the food safety system (physical health) of Hazard Analysis and Critical Control points (HACCP) by creating a basic system for their own work in the lab. This activity is both vital for a career in food safety, as well as understanding how to keep food safe for their own health and physical wellbeing. Critical and logical thinking is built into these activities as the students will progress from learning these new skills to applying them and discerning when to apply the techniques they have learned. To create the HACCP plan, students must critically analyze their process and determine where hazards could be introduced or eliminated. Students must use the information from the class and lab and extrapolate to other situations or products. These tasks are valuable for any student of any discipline as they are expected to use abstract information learned previously to predict an outcome in an actual process. With the use of pre-lab assignments, students will be expected to understand the activity and predict the outcomes. They will then have assignments post-lab to reflect on if their predictions were correct. There is also an element of critical thinking in all of the short answer quizzes and the final.

ELO 1.2 Engage in an advanced, in-depth, scholarly exploration of the topic or idea of the theme. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

This course is intended to build on the foundations of Biology and Chemistry. Successful students will have an understanding of the basic chemical composition of food and reactions that are responsible for the foods they eat. Students will also have a general understanding of the practices for food sanitation and waste management (physical health) as well as an overall view of the regulations that govern the food supply, use of food additives, and food colorants (policy related to public health). These topics directly relate to health and wellbeing by giving students the foundational knowledge necessary to select and prepare safe and healthy food. Through the scientific method of hypothesis testing, students will learn how to employ food processing techniques and analytical equipment in that testing. They will also learn how to ensure the food made is safe, both in an industrial setting with specific regulations as well as how those same principles are important in a home kitchen.

Students will be required to complete pre-lab assignments to ensure they are preparing an appropriate hypothesis to test, and students will complete post-lab assignments to evaluate the data collected and draw appropriate conclusions. Further in-depth exploration of food science is taught through product formulation activities, and reporting of information through executive summaries and lab reports. These are common professional means of reporting data and results, but is an advanced methods of written communication. Though this class is a foundational level of learning in Food Science, it will provide students an in-depth study in both common tasks of a professional food scientist as well as food safety. Students outside the Food Science majors will be able to apply these concepts in their lives when cooking in their home kitchens.

Course subject & number FDSCTE2400

GOAL 2: Successful students will integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.

ELO 2.1 Identify, describe, and synthesize approaches or experiences as they apply to the theme. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Food is a universal topic. Everyone eats and assumes the food they consume is safe. This class will give students an overall view of the food matrix and the multiple disciplines that are associated with food science. This overview will build on their previous knowledge of chemistry and biology as well as giving students a scientific view of things they have done in their own kitchens and even in play as a child, such as mixing ingredients or cutting dough shapes. The transformation of prior knowledge and experiences will give students a foundation to think about food science as it relates to health and wellbeing and the knowledge to ensure the food that they prepare is safe. Students are asked to select a food that interests them; this food becomes the focus of their term project. The assignments involved in the project are common to both the types of activities one might do at home in a kitchen or as a food scientist as a first step in the product development process. These ideas are reiterated throughout the entire course; starting with identifying basic food attributes and how to test them, basic unit operations such as mixing and size adjustment, components of food and how they interact, methods of preservation, identification of hazards and the laws that ensure food processors take the proper steps to scientifically ensure safe food production. These concepts are taught and assessed through classroom discussions and lab activities in which students will synthesize the information learned along with previous experiences.

ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

The material develops the students' sense of self as a learner with lab experiences that challenge their prior knowledge and allow them to apply these ideas to productive activities that will build their knowledge of physical, scientific, and career health and wellbeing. Time for reflection and self-assessment will be given through low-states short answer quizzes and post-lab assignments. Quizzes and post-lab assignments both will ask students questions intended to apply past experience with the outcomes and new information gathered in class and labs. Incorporated into the term project assignments (formulation, variable, and planning worksheet) are creative elements (creating/adapting a recipe, learning the process needed to make the product, predicting the outcome of a variable). The course is then capped by a self and peer assessment, in which students will reflect on how did they respond to the assignments and if they contributed to the best of their ability. Opportunities for reflection are also built in with the use of pre-lab assignments. In the pre-lab assignments students will be expected to understand the activity and predict the outcomes. They will then have assignments post-lab to reflect on if their predictions were correct.

Course subject & number FDSCTE2400

Specific Expectations of Courses in Health & Wellbeing

GOAL Students will explore and analyze health and wellbeing through attention to at least two dimensions of wellbeing. (Ex: physical, mental, emotional, career, environmental, spiritual, intellectual, creative, financial, etc.).

ELO 1.1 Explore and analyze health and wellbeing from theoretical, socio-economic, scientific, historical, cultural, technological, policy, and/or personal perspectives. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

This course will allow students to delve into physical and career health and wellbeing. Students will connect previous experiences with food and education in chemistry and biology to the methods employed by those with careers in food science to make safe, quality foods. Students will expand their scientific understanding of food safety as it applies to physical health. Furthermore, students will explore and analyze the policies in place to ensure companies are following those best practices and how those have changed over the history of food manufacturing in the US and the impacts to public health. Students will practice those techniques in lab activities as well as working through the regulatory process for foods of their choice by completing a hazard analysis and critical control (HACCP) plan. At the completion of this course, students will have adequate analytical experience to gain entry-level employment in quality assurance positions in a food production facility as well as adequate knowledge to create safe, quality food for their own consumption.

ELO 1.2 Identify, reflect on, and apply the skills needed for resiliency and wellbeing. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. *(50-700 words)*

Resiliency in scientific endeavors means to evaluate, and troubleshoot why an experiment may not have had the outcome intended or expected. Students will use the scientific method to plan, carry out, and review experiments in the labs. During their follow-up reviews, worksheets, executive summaries ,and lab reports, the students will need to examine their hypotheses and explain their data. As in real life, in many cases, the results will not be expected because of human error as these are novice learners. Students will have to troubleshoot and critically think about their methods and materials to improve on the results. This will begin with low-stakes follow-up assignments (lab worksheets), and will culminate with a higher-stakes final lab report. By offering multiple opportunities for students to identify and reflect on their results and to devise ways to improve, students will develop the strategies for resiliency that that they will need in their everyday lives and in food science careers.