

Food Science 411 – Food Science Capstone

MWF 9:05AM - 9:55AM (006 TNS), Mo 10:10AM - 1:10PM (002 TNS/Newton Building)

1. Instructor

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I have an open door policy, but if you are coming a long way to talk to me, I recommend making an appointment. Email is usually the most effective way of communication.

2. Course Description

As the course title implies, the Food Science Capstone course provides you with the opportunity to complete your Food Science education at the University of Delaware with a final problem-based learning experience. The class is centered on the goal of developing a novel food product. You will form Product Development Teams, come up with a product idea and, after discussion and approval by the instructors, develop a product from raw materials to marketplace launch. In the process, you will apply your accumulated knowledge in all aspects of Food Science (Food processing, chemistry, analysis, engineering, microbiology and others), but also acquire new insights into sensory evaluation, marketing and food regulations.

3. Course Objectives

- Complete the food science learning experience by utilizing knowledge gained over the last four years.
- Become more proficient in writing and speaking the language of your discipline.
- Emphasize the responsibility a food scientist has for food safety and quality from the farm to the table.
- Utilizing knowledge and practical experience gained over the previous seven semesters to develop a novel food product.

Specifically:

1. Plan a project from conceptual stage to a final product (including establishing a research budget)
2. Evaluate and refine recipes
3. Interact with target groups (surveys, taste tests)
4. Interact with “mentors” (experts in the field)
5. Evaluate data from taste panels
6. Write product development reports
7. Apply or locate all necessary analytical techniques
8. Make a food label
9. Know about laws and regulations governing the developed food product.

10. Conceptualize an actual factory setting for the production of the developed food product (equipment and personnel, supply and waste management etc)
11. Arrive at cost estimates for the final product
12. Develop a marketing strategy (including advertisement)

The teaching and learning tools are intended to achieve learning outcomes that are in line with the goals of the **Department of Animal and Food Sciences**:

- Think critically; use quantitative reasoning, skeptical inquiry and the scientific approach to solve problems in animal and food sciences.
- Effectively communicate scientific ideas orally and through writing
- Demonstrate knowledge of major scientific concepts, social, economic and ethical implications in the animal and food sciences
- Work collaboratively and independently, learning from diverse perspectives to assimilate knowledge and synthesize new solutions and ways of thinking.

The learning goals of this course are also aligned with the GOALS OF UNDERGRADUATE EDUCATION at the University of Delaware which state that, upon graduation, students should be able to:

- (1) Read critically, analyze arguments and information, and engage in constructive ideation.
- (2) Communicate effectively in writing, orally, and through creative expression.
- (3) Work collaboratively and independently within and across a variety of cultural contexts and a spectrum of differences.
- (4) Critically evaluate the ethical implications of what they say and do.
- (5) Reason quantitatively, computationally, and scientifically.

4. Course Philosophy

By this point in your college career, you have obtained an enormous amount of information, but unless you can use that information to solve new problems, it merely consists of facts, and nothing more. I hope that by participating in this course you will learn how to convert the information to the knowledge you need to solve a food science problem.

Conversion of facts and figures to knowledge is neither easy nor impossible. It does require critical thinking. Speed and efficiency improves with practice. There are a number of ways to practice critical thinking. One of these is writing and the other is discussion with learned colleagues. You should be able to access all types of information from diverse sources. Reference articles, faculty, suppliers, equipment manufacturers, and many websites are valid sources of information. Your job becomes one of a filter, sorting out the irrelevant and erroneous information. You also must become an architect, designing a structure of information to serve your purpose.

Finally, one of the best things about college is that it can be a protected environment. We cannot “fire” you if the project does not go as planned. If you discover at the end of fifteen weeks of hard work that you were on the wrong track, then you will have learned something. It

is the work, the thinking, and the honest attempt that we will be evaluating during this course. I have every confidence you will create a successful product, but remember in this course the process is as important as the product.

5. Course Organization, Expectations, and Aids

a. Course Web Site: Sakai

Food Science Capstone is a sakai-based course.

Your grades will be posted on sakai and you can use this site as a center for your collaborations and to post any information you want to share with your group or with the rest of the class.

b. Groups

Number of groups and membership in the groups depend on the enrollment in the class. The instructor reserves the right to assign students to specific groups for reasons such as balancing experience and project goals. Within your groups, each member will have a different role. For example, one member might be the marketing specialist, one a food engineer, one a food chemist, and one quality control.

The final grade for each student will be strongly dependent on the group. As this is the case, I urge you to have group rules and regulations to cover problems, for example, when one member does not pull his or her own weight.

c. University Access Policy

If you have special needs as addressed by the Americans with Disabilities Act and need test or course materials provided in an alternative format, notify one of your instructors immediately. Reasonable efforts will be made to accommodate your special needs.

d. Excuses and Attendance

You are expected to attend every class. If you need to miss a class, please inform the instructor beforehand.

Assignments are due as indicated in the schedule. Twenty percent of the total available points will be deducted for each day late, beginning immediately after the class period in which they are due.

For late assignments, grades are not awarded for excuses, even if they are inventive. Not getting the job done in the business world, results in poor performance reviews that lead to eventual loss of employment. You are at a stage in your studies where you will be held responsible for the results of your choices and actions.

I know that there can be extenuating circumstances for missed classes or deadlines, and I am willing to negotiate options for make-up work. If you have a crisis on the day of a scheduled assignment, call immediately. Calling or emailing after the fact is not acceptable.

e. Academic Honesty

Academic honesty requires, in colloquial terms, that you do your own work. Knowledge and information are the currency of the University system, stealing these from others is as

dishonest as stealing stereos from your neighbors. Both in and out of the classroom, you must protect your integrity by being scrupulously honest in your intellectual endeavors. This maxim requires that you give proper credit for ideas that are not your own. It demands that you will not steal answers from your colleagues.

It is the official policy of the University of Delaware that all acts or attempted acts of alleged academic dishonesty be reported to the Dean of Students Office for disposition within the University Undergraduate Judicial System. Information explaining the University's policy and general procedures for handling Undergraduate Student cases of academic dishonesty can be found on the WWW in the Official Student Handbook .

All Graduate Student infractions will be referred to the Administrator for Graduate Studies for Academic Affairs. For further information please see the Dean of Student's Office website [DOS](#).

f. Responsible Computing

Please see: <http://www.udel.edu/stuhb/>

g. Code of Conduct

Disruptive conduct: <http://www.udel.edu/stuhb/>. An example of disruptive conduct is ringing beepers or cell phones.

h. Asking for Help with the Project (Mentors)

Progress of your project frequently depends on input from people with specific expertise. In many cases, this expertise resides outside the University. It will be up to you to find and contact such experts and ask for their help. This help could be in the form of advice or of the donation of materials. The instructors have some contact information (for example from former UD students working in industry), but you will also have to search the internet and other sources for contacts. You will need to document that you have contacted a person for advice, and at the end of the semester, you will have to submit emails, letters, notes of phone conversations to demonstrate your efforts.

6. Grading

a. Items to be Graded

Item	Points
Oral presentation: Initial product development (Group)	0 – 10
Written report: Initial product development (Group)	0 – 20
Oral presentation: Progress report (Individual presentation on role and progress)	0 – 10
Progress Report (Group)	0 – 20

Mid-term course assessment (~1 paragraph), short writing assignments	0 or 5
Final report (Group)	0 – 30
Product (Group) (How far has project progressed towards reasonable expectations?)	0 - 20
Contribution of primary literature pertaining to project.	0 – 10
Product launch (organization, interaction with public, advertisement etc.)	0 – 20
Contact with mentors (phone calls, emails to outside sources, consultations with other faculty)	0 - 10
Rating by group members	0 - 10
Self-assessment (What did you learn? How was the learning accomplished? How do you think you will be able to use what you have learned?)	0 - 20

b. Grading Scheme

There is NO EXTRA CREDIT. The following grades CANNOT be negotiated. A curve is already included in these grades. Incomplete only given after discussion with instructor.

Grade	>%
A	93
A-	90
B+	85
B	80
B-	75
C+	70
C	65
C-	60
D+	55
D	50
D-	45
F	< 45%

7. Calendar

Assignments and their deadlines are posted on the sakai website for this course. The instructor has the right to change dates for handing in assignments and for events such as guest speakers if necessary.

During the first week of the class you will discuss how you will go about developing a new product for the food market. Then you will do research and decide which product you want to

develop. You will need to discuss your product idea with the instructor and, after a consensus on the project is reached, you will develop the product – including taking into account safety, shelf-life, packaging, marketing etc.

8. Special Instructions

a. Writing Assignments

This class requires intensive writing. Each assignment has a specific purpose in the progression of our product development exercise. Most of the documents need to conform to a certain pattern of presentation. This document illustrates the expected format and gives an overview of the writing expected from you during the semester. You should use this format for your writing assignments.

Your reports will need to contain the following elements.

Title: In a single sentence explain what the document is about. It may help in writing the title if you consider that it should give enough information so the intended audience will know what to do with the document, i.e., where to file the information, is the document critical, should someone else read it, etc.

Authors: List authors alphabetically

Abstract/summary: An expansion of the title, including a statement about all of the sections of the memo to follow.

Background: This section is the ‘meat’ of the paper. This should contain enough detail for the reader to get a clear picture of the problem addressed. References may be included but should be kept to a minimum. You should direct the reader to specific appendices, earlier reports, or major reviews if appropriate.

Appendices: In this section you can include references, graphs and charts, reprints, other memos or any other supporting documentation.

As you move from the front to the back of the document, each section becomes more detailed. In addition, it means that it is less likely that someone will read it. By the time you get to the appendices, you should expect that only the most curious would read these materials. Nevertheless, they will be available should the need arise (in this case, when you want to find out what the current assignment entails). As you are writing these reports as a team effort, I urge you to edit the work carefully to minimize stylistic differences. Writing assignments will receive lower grades if they appear to have been written by two or three people.

You must type all assignments generally 12 point type, 1" margins, and double spaced. You will revise most of the assignments and some portions of earlier projects could ultimately appear in the final report. All graphs and charts must be prepared using computer aided graphics. You may submit all materials except your final report electronically (E-mail, rjoerger@udel.edu).

A final note: Be brief and clear. Short sentences and small words are great. Use jargon carefully, but since the readers in this class are familiar with food science, it can serve to shorten sentences and express ideas quickly. Too much or improperly used jargon, however, can lead to confusion. Your grades will not be based on length of the report, but on its clarity.

Editing: All reports will be submitted as "finished" drafts (essentially complete version), graded by the instructor and can be resubmitted a week later for a new grade if corrections are made.

b. Oral presentations

Medium: You must use PowerPoint or equivalent for presentations.

Goal: You are trying to impress “Management” and your peers that your idea is the one that they should pick.

Your Appearance: Dress for presentations should represent the fact that these are important professional meetings.

Slide format: See Food Technology, January 2001

Grading of presentations: Based on clarity, quality of slides, accurate information, adequate content, use of graphics, speaking.

Presentations:

1. Initial Product Report
2. Individual Presentation
3. Product Launch

Product launch: You are expected to have a display (poster, other visual aids such as video, computer website demonstration) depicting proposed advertising and to be prepared to offer and explain your product to the general public.

9. Requirements for Completion of Honor Section

Students enrolled in the Honors section will meet with the instructor at the beginning of the course to decide upon activities to fulfill the requirements for this section. The activities will be in accordance with the guidelines provided by the Honors Program. An example of such activities could be:

1. **Meetings** with the instructor on a regular basis. These meetings will be either weekly or bi-weekly, depending on the status of assignments to be discussed.
2. A **short paper based on an interview** with an alumni or other person working on product development in industry. The topic of the interview has to be relevant to the class project and provide useful information to the other students. The paper is due during the 4th week of class and should be about two pages in length.
3. A second writing assignment, due prior to Spring Break, shall provide an **analysis of the consumer** targeted by the product under development. The analysis can be based on informal conversations with other students, shoppers, relatives etc or on a survey of similar products already on the market and the consumer groups targeted by advertisement etc.
4. Honors students will read and **review two books** on topics relevant to the product development process. The reviews shall focus on information of importance to the current project or to the future career of the classmates. (The written reviews will be made available to the class and become part of the final report.) The first review is due mid-term, the second is due two weeks prior to product launch.

- Honors students will select **six publications** (scientific papers, review articles, newspaper or magazine articles) that are of relevance to the current project or to food product development in general and present short written or oral reviews of the publications to the class. Three of the review presentations will be scheduled prior to mid-term, the other three during the remainder of the semester.

Appendix 1: Specific Oral Presentations

a. Initial Product Report

Audience: Your peers and management (instructors)

Purpose: To present ideas on your product.

Length: 30 min plus

The topics are similar to those in the written report (see below), but should be presented using the advantages of PowerPoint. Thus, you should introduce your company and demonstrate that you have thought about the process of product development (e.g. raw material supplies, processing steps, marketing, potential modes of failure etc.)

b. Individual Progress Reports

Audience: Your peers and management

Purpose: Present your role in producing the final product

Length: 10 min

At the beginning of the semester, you decided on a “role” you will play in the development of your food product. You might be marketing specialist, food chemist, quality control manager, food engineer. For this presentation, give a brief introduction to how you carried out your role in the production of your food product. The focus of your presentation should be on what you did, what results you have, and what is left before product launch. This presentation should be less detailed than your written report.

c. Product Launch

Audience: The public

Purpose: To introduce your product to a select audience, the College of Ag and Natural Resources.

This is it. Your product is ready to sell to an unsuspecting public. How will you convince the consumer that your product is a novel product? All advertising and marketing techniques are permitted. Grades are high for originality!

Appendix 2: Specific Writing Assignments

a. Initial Product Report

Audience: Project Leader R. Joerger

Format: Business Report (5-7 pages)

After selecting your product, your teams will need to decide if it is a viable product. Using currently available products in retail distribution, you must perform an in-depth analysis of the product. Include references to relevant research, supplier and trade publications. Include the following (not necessarily in this order):

- What the product is
- Market-niche the product fills, including information on probable consumers.
- Analysis of the ingredient list, noting the probable function of each ingredient.
- Equipment required to produce the item.
- Evaluation of packaging and suggestions for the types of materials needed for adequate protection and shelf-life.
- Description of the most probable 'mode of failure' for the product.
- Regulatory legal and regulatory issues

After you write your analysis, the document will be reviewed and then revised by your group before presenting the product to the rest of the class.

c. Progress Report

Audience: Project Leader R. Joerger

Format: Business Report (2-3 pages)

As you work towards developing the prototype product, you will need to keep track of your activities and discoveries. For evaluation purposes, update your project leader on your progress. Address the following questions:

- Have you developed your product? If so, how?
- What problems have you faced?
- What quality parameters have you tested, how did your product perform?
- What will you do next?
- Significant discoveries from experiments or literature review
- Supplier contacts (name, company and phone)
- Involvement from mentors
- Legal and regulatory issues

d. Individual Members Reports

Audience: Colleagues, Project Leader R. Joerger

Format: Business Report (3-5 pages)

Inform your colleagues and project leader of any research that you have done. Give a background into your role in the product development team. What part will you play in developing the final product? What tests will you carry out to check that the product is satisfactory and safe?

e. Mid-term assessment

Audience: Instructor only. The assessment will not be shared with other students.

Format: In about one paragraph, summarize what you have learned so far, how well you and your group members are working together, what suggestions you have for the second part of the semester. You will receive 5 points just for turning in the assessment.

f. Final Report

Audience: Colleagues, Project Leader R. Joerger

Format: Formal Report (10-15 pages + appendices)

Now you have developed the product prototype. You need a persuasive document to convince upper management to fund commercial scale development of the new food product. The format of the document is up to the product development team, but you must include at least the following elements:

- Complete description of the product, including target audience, formulation and calculated nutritional content
- Proposed manufacturing sequence
- Hazard Analysis and Critical Control Points of proposed manufacturing scheme and Control Points encountered during probable storage, distribution and marketing cycle. When possible, include specific testing necessary to monitor Control Points
- Regulatory issues, including any approvals that must be obtained
- Additional development and testing in progress or proposed

g. Self Assessment

Audience: Project Leader R. Joerger

Length: 1-2 pages, double spaced

Content:

- What was (were) the most important thing(s) you learned in this class?
- How did the learning occur?

- What contributed most to the learning experience?
- How do you evaluate your contribution to the learning experience?
- What are the most important things you learned in class that you will be able to use in your post-graduate career?

Appendix 3: Collections

1. Collection of primary literature

Each group will collect literature relevant to the development process. The literature will be collected in a folder, and each student will clearly mark the articles he/she has contributed. Each student will receive a grade that is based on the quantity and relevance of the primary literature provided.

2. Collection of mentor information

Each group will maintain a folder that contains information collected from mentors. The information can be documented in the form of print-outs of emails, of notes taken during or after phone calls or meetings with mentors. Each student will clearly identify his/her mentoring efforts, and points will be given based on number and relevance of mentor contacts. Efforts towards identifying and inviting guest speakers also have to be documented and will be included in the grade.