



PennState
College of Agricultural Sciences

Department of Food Science



Undergraduate Program Handbook

Program Year: 2017

Prepared for undergraduates & prospective students considering a major in Food Science.

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Not a Penn State student but thinking about majoring in Food Science? Visit Us!

Schedule a visit at: <http://agsci.psu.edu/futurestudents/visit>

What is Food Science?

Food Science is the study of food and food production through a scientific lens. This unique field allows students to apply the basic sciences to real-world problems and make connections between what they learn and the food they eat. A Food Scientist applies chemistry, microbiology, animal science, nutrition, engineering, and more to produce high quality food. Food science plays a key role in the health, welfare, and economic status of nations and can serve society by assuring food availability, affordability, wholesomeness, and safety. Some of the most common areas of food science, as specified by the Institute of Food Technologists (IFT), appear below. ¹

Food Quality and Microbiology

Consumers trust that the food they buy is safe to eat under all circumstances. Food microbiologists and quality assurance specialists focus in food safety, food spoilage, preservation, foodborne illness, food hygiene, lab management, and quality control.

Food Engineering

Food engineers specialize in the interface between processing and the food itself. They understand the properties of food that affect heat transfer, liquid flow, viscosity, and other technical processes.

Product Development

These creative food scientists think up the new products found on grocery shelves. Product developers work as a team to bring safe, healthy, and delicious products to consumers.

Food Chemistry

Food Chemists focus on the interactions between ingredients on a molecular level. They analyze foods to improve methods of production, understand the effects of processing, create new additives and flavors, and ensure foods to abide by regulations.

Sensory Science

Sensory scientists conduct “taste test” experiments to find out what consumers perceive in food products. They evaluate the smells, tastes, feelings, and visual appeal of food to make a product that tastes good.

Food Marketing and Sales

Food Marketers use their knowledge in food science to communicate and promote food products to the world. Food Marketers also work with product developers to imagine products to fit openings in the food market.

^[1] Institute of Food Technologists. *Careers in Food Science*. Chicago, USA; Institute of Food Technologists.

Why Food Science at Penn State?

The Food Science major at Penn State is recognized by the Institute of Food Technologists (IFT) as an approved undergraduate program that meets the education standards set forth by this professional organization. These standards ensure that our program fosters rigorous scientific training and ensure the development of professional skills needed for our students to be successful post-graduation. Our undergraduate Food Science Major offers students hands-on experience dealing with real-world applications; small, friendly atmosphere; world-class internship experiences; excellent scholarship opportunities, and an extremely high success rate of job placement for graduates from the major. Additionally, the outstanding faculty, state-of-the-art building and laboratory facilities, and friendly and dedicated staff members make the Food Science Department a pleasant place to study and conduct research.

Recommended Academic Plan for Food Science at University Park

Effective Date: Fall 2016

Semester 1 (Fall)

Course Details	Credits
CHEM 110 Chemical Principles I † [Prereq for FDSC 200, BMB 211]	3
CHEM 111 Experimental Chemistry I †	1
ENGL 015 Rhetoric and Composition or ENGL 030 Honors Freshman Composition †	3
BIOL 110 Biology: Basic Concepts and Biodiversity †	4
First-Year Seminar	2
Social and Behavioral Sciences (GS) ¹	3
Total Credits	16

Semester 3

CHEM 202 Fundamentals of Organic Chemistry I or CHEM 210 Organic Chemistry I * [Prereq for FDSC 400, BMB 211]	3
FDSC 200 Introductory Food Science * [Prereq for upper level FDSC courses]	3
FDSC 201 Introductory Food Science Practicum * [Prereq for upper level FDSC courses]	1
MICRB 201 Introductory Microbiology [Prereq for FDSC 408, FDSC 409]	3
MICRB 202 Introductory Microbiology Laboratory * [Prereq for FDSC 408, FDSC 409]	2
Humanities (GH) ¹ (IL) ²	3
Total Credits	15

Semester 5

FDSC 400 Food Chemistry	4
FDSC 408 Food Microbiology [Prereq for FDSC 411]	3
FDSC 409 Laboratory in Food Microbiology	2
BMB 212 Elementary Biochemistry Laboratory [Prereq for FDSC 400, FDSC 406]	1
Arts (GA) ¹	3
CAS100A Effective Speech †	3
Total Credits	16

Semester 7

FDSC 413 Science and Technology of Plant Foods	3
FDSC 411 Managing Food Quality	3
Career Interest Courses (Supporting Courses)	3
Career Interest Courses (Supporting Courses)	3
ENGL 202C Effective Writing: Technical Writing or ENGL 202D Effective Writing: Business Writing †	3
Total Credits	15

Semester 2 (Spring)

Course Details	Credits
CHEM 112 Chemical Principles II * †	3
CHEM 113 Experimental Chemistry II	1
MATH 110 Techniques of Calculus I or MATH 140 Calculus with Analytic Geometry I †	4
[Prereq for FDSC 405]	
Social and Behavioral Sciences (GS) ¹	3
Health and Physical Activity (GHA) ¹	3
Total Credits	14

Semester 4

CHEM 203 Fundamentals of Organic Chemistry II or CHEM 212 Organic Chemistry II AND CHEM 213 Laboratory in Organic Chemistry	3 or 5
B M B 211 Elementary Biochemistry [Prereq for FDSC 400, FDSC 406]	3
PHYS 250 Introductory Physics I [Prereq for FDSC 405]	4
STAT 250 Introduction to Biostatistics or STAT 240 Introduction to Biometry † [Prereq for FDSC 411]	3
Arts (GA) ¹	3
Total Credits	16 or 18

Semester 6

FDSC 405 Food Engineering Principles*	3
FDSC 410 Chemical Methods of Food Analysis	3
FDSC 406 Physiology of Nutrition (Writing intensive)	3
Humanities (GH) ¹ (US) ²	3
Career Interest Courses (Supporting Courses)	0 or 2
Total Credits	12 or 14

Semester 8

FDSC 414 Science and Technology of Dairy Foods	3
FDSC 415 Science and Technology of Muscle Foods	3
FDSC 430 Unit Operations in Food Processing	3
Career Interest Courses (Supporting Courses)	3
Career Interest Courses (Supporting Courses)	3
Total Credits	15

*Course requires a grade of C or better

†Course satisfies both General Education and degree requirements

¹6 credits, minimum, of GH, GS, and GA general education courses, and 3 credits minimum for the GHA requirement. These courses may be taken in any semester or sequence.

²Three credits of each of United States Cultures (US) and International Cultures (IL) are needed for graduation.

Note: Be wary of adjusting the sequence of FDSC courses!

FDSC courses are generally only offered in the semester (Fall or Spring) in which they appear above!

Courses Offered by the Department of Food Science

Course titles followed by (*) indicate a required grade of C or higher. ***Pay particular attention to the pre-requisites for the required courses and plan your schedule accordingly!*** For more information regarding courses and scheduling, refer to the University Bulletin at:

<http://bulletins.psu.edu/undergrad/courses/F/FD%20SC/>

Required Food Science Courses for Graduation:

FDSC 200: Introductory Food Science* (3 cr.)

General overview and principles of food science including food constituents and properties, quality and safety, preservation methods, processing animal and plant products.

Prerequisite: CHEM 110 (Fall only)

FDSC 201: Introductory Food Science Practicum* (1 cr.)

Demonstrations and experiments illustrate actual chemical reactions in food systems and include visits to campus and area food production and processing operations.

Prerequisite or concurrent: FDSC 200 (Fall only)

FDSC 400: Food Chemistry (4 cr.)

Chemical properties of food constituents as influenced by processing and storage. Selected experiments and demonstrations illustrate chemical reactions of importance in foods.

Prerequisite: CHEM 202

Prerequisite or concurrent: FDSC 200 & 201, BMB 211 & 212 (Fall only)

FDSC 405: Food Engineering Principles* (3 cr.)

Engineering principles of importance to food manufacturing, including units, dimensions, mass and energy balance, fluid flow, rheology, heat transfer, and psychrometrics.

Prerequisites: MATH 110, PHYS 250 (Spring Only)

Prerequisite or concurrent: FDSC 200 & 201

FDSC 406W: Physiology of Nutrition (3 cr.)

Writing intensive course that covers physiological mechanisms involved in thirst and appetite, digestion, absorption, utilization of nutrients, respiration, and body temperature regulation.

Prerequisite: B M B 211

Prerequisite or concurrent: FDSC 200 & 201 (Spring only)

FDSC 408: Food Microbiology (3 cr.)

Significance of microorganisms in food commodities, microbial spoilage, food-borne infections, and intoxications; methods of preservation, processing, and control.

Prerequisite: MICRB 201 (Fall only)

Prerequisite or concurrent: FDSC 200 & 201

FDSC 409: Food Microbiology Laboratory (2 cr.)

Course covers methods of isolation and detection of spoilage and pathogenic microorganisms in foods; effects of processing and preservation on survival of food microorganisms.

Prerequisite: MICRB 202 (Fall and Spring)

Prerequisite or concurrent: FDSC 200, 201, & 408

FDSC 410: Chemical Methods of Food Analysis (3 cr.)

Introduces qualitative and quantitative methods for determination of food constituents.

Prerequisite: BMB 212, FDSC 400

(Spring only)

Prerequisite or concurrent: FDSC 200, 201

FDSC 411: Managing Food Quality (3 cr.)

Principles and applications of Hazard Analysis Critical Control Points. Introduces statistical tools for the control and improvement of food quality.

Prerequisite: FDSC 408, STAT 250

(Fall only)

Prerequisite or concurrent: FDSC 200, 201

FDSC 413: Science and Technology of Plant Foods (3 cr.)

Physical and chemical behavior of plant-based raw materials and ingredients, with emphasis on parameters influencing finished product quality.

(Fall only)

Prerequisite: FDSC 200 & 201, and at least 2 of: FDSC 400, 405, 408, or 410

FDSC 414: Science and Technology of Dairy Foods (3 cr.)

Physical and chemical behavior of dairy-based raw materials and ingredients, with emphasis on parameters influencing finished product specifications.

(Spring only)

Prerequisite: FDSC 200 & 201, and at least 2 of: FDSC 400, 405, 408, or 410

FDSC 415: Science and Technology of Muscle Foods (3 cr.)

Physical and chemical behavior of muscle food commodities, with emphasis on muscle-based ingredients in formulated foods.

(Spring only)

Prerequisite: FDSC 200 & 201, and at least 2 of: FDSC 400, 405, 408, or 410

FDSC 430: Unit Operations in Food Processing (3 cr.)

Thermal processing, refrigeration, freezing, dehydration, and concentration in the food industry, including effects on food quality, food packaging and waste management.

Prerequisite: FDSC 400, 405, 408.

(Spring only)

Food Science Electives:

FDSC 105: Food Facts and Fads (GHA, 3 cr.)

Impact of society and the individual on modern food technology, food laws, additives, etc.; historical, current, futuristic aspects.

(Fall, Spring and Summer)

UNDECIDED?

For students considering Food Science as a major, FDSC 105, a GHA course, introduces students to concepts in food science and can help gauge your interest.

Food Science Career Interest Courses:

FDSC 207: (AN SC 207) Animal Products Technology

Composition, safety, palatability, preservation, and processing of foods from animals; impact of animal production and handling practices on product properties. *(Fall only)*

FDSC 208: (AN SC 208) Animal Products Technology Laboratory

Harvesting and processing of foods from animals; demonstrations and hands-on exercises; industry procedures for processing meat, milk, and egg products.

Prerequisite or concurrent: FDSC/AN SC 207 *(Fall only)*

FDSC 233: (HORT 233) The Science of Winemaking (3 cr.)

Introduction to the principles of wine production emphasizing basic wine grape biology, fermentation science, wine chemistry, and wine perception.

Prerequisite: CHEM 110 or BIOL 110 *(Spring only)*

FDSC 402: Supervised Experience in Food Science Teaching (maximum 3 cr.)

Theories and experiences of teaching and learning relevant to food science and to the work of a teaching assistant.

Prerequisite: Junior or senior standing. Permission of program required. *(Fall and Spring)*

FDSC 404: Sensory Evaluation of Foods (3 cr.)

Sensory evaluation of food, methods of test analysis, panel selection and training, taste sensation theory, consumer testing methods.

Prerequisite: STAT 250 or STAT 240. *(Fall only)*

FDSC 407: Food Toxins (2 cr.)

Microbiological and chemical aspects of food poisoning; toxicological principles; case histories and prevention of problems.

Prerequisite: senior standing in food science or related majors *(Fall only)*

FDSC 422: Communicating Research in Agricultural Sciences (1 cr.)

Develop effective communication skills within the context of scientific research using independent research. Includes grant writing, poster presentations, and oral presentations about research topics. *(Fall and Spring)*

FDSC 495: Internship

Supervised off-campus, non-group instruction including field experiences, practical, or internships. Written and oral critique of activity required.

Prerequisite: PRIOR APPROVAL REQUIRED *(All semesters)*

FDSC 496: Independent Studies

Creative projects, including research and design, which are supervised on an individual basis and which fall outside the scope of formal courses. Interested students should discuss with their advisor or another faculty member. *(All semesters)*

FDSC 497: Special Topics*(Semester varies)*

Courses offered sporadically which may explore many different interests. Several different Special Topics courses may be taught in one year or semester. Examples of past courses include Foods for Gut Health, Careers in Food Science, and Food Safety Research.

FDSC 499: (IL) Foreign Studies (maximum of 12cr.)*(Semester varies)*

Courses offered in foreign countries by individual or group instruction. Past courses have traveled to Italy and India.

Career Interest Courses (Supporting Courses)

Career Interest courses, called “Supporting Courses” in LionPATH, add variability and personalization to the general Food Science degree. These courses are chosen by the student to provide more depth into subject areas related to their professional goals. Career Interest Courses make up 12-14* credits of a student’s overall degree.

NOTE:

Of the Career Interest Courses selected, it is recommended that 50% of them (6 or 7 credits)* be 300-400 level courses in areas relevant to the student’s career interest. These courses are intended to provide an advanced understanding of a topic or interest outside of the required food science courses. For a career interest course outside of the program to be considered part of the 12-14* credits, the student *must speak with their advisor*. With prior advisor approval, courses taken for a minor or second major may also be counted as supporting courses

*Students will take 2 credits more of career interest if they take CHEM 202 and 203.
Students in CHEM 210, 212, and 213 will take 12 credits of career interest.

The career interest courses provided by the Food Science department are listed in the previous section. The following courses are examples of potential career interest courses available to Food Science students. However, they are not the only courses available! Students are encouraged to explore their own interests and find suitable courses on track with their career goals. For more information about the courses below, refer to the LionPATH Course Catalog.

Interest in Business

AG 400 ¹	Biometry/statistics in the life sciences	Fall Only
ACCTG 211 ¹	Financial and managerial accounting for decision making	All semesters
AGBM 102	Economics of the food system	Fall and Spring
AGBM 200	Introduction to agricultural business management	Fall and Spring
AGBM 302 ²	Food product marketing	Fall and Spring
AGBM 440 ¹	Food product innovation management	Fall only
AGBM 460 ²	Managing the food system	Fall only
BA 250 ²	Small business management	All semesters
BLAW 243 ¹	Legal environment of business	All semesters
IB 403 ²	International business and national policies	Fall and Spring
FIN 100 ¹	Introduction to finance	All semesters
MGMT 100	Survey of management	All semesters

MKTG 220 ¹	Introduction to selling techniques	All semesters
MKTG 301 ²	Principles of marketing	All semesters
MKTG 342 ²	Marketing research	All semesters

¹Prerequisites covered by the first 2 years of FDSC (if following RAP)

²Prerequisites needed before eligible for course

Interest in Plant Science and the Environment

AGECO 134	Sustainable agriculture science and policy	Fall only
BIOTC (AGRO) 460 ²	Advances and applications of plant biotechnology	Spring only
E R M 210	Environmental factors and their effect on your food supply	Spring only
E R M 431 ¹	Environmental toxicology	Fall only
HORT 101	Horticultural science	Fall and Spring
HORT 412W ²	Post-harvest physiology	Spring only

Interest in Animal Science

AN SC 100	Introduction to animal Industries	Spring only
AN SC 201	Animal Science	Fall and Spring
AN SC 211 ¹	Introduction to avian biology	Spring only
AN SC 213 ¹	Introduction to animal biotechnology	Fall only
AN SC 225	Introduction to dairy judging	Spring only
AN SC 226 ²	Meat selection and grading	Spring only

Interest in Microbiology, Cell Biology

B M B (MICRB) 251 ¹	Molecular and cell biology I	Fall and Spring
B M B (MICRB) 252 ²	Molecular and cell biology II	Fall and Spring
B M B 401 ²	General biochemistry	All semesters
B M B (VB SC) 433 ²	Molecular and cellular toxicology	Fall and Spring
BIOTC (MICRB) 416 ²	Microbial biotechnology	Fall only
BIOTC 479 ²	Methods in biofermentations	Fall and Spring
CHEM 450 ²	Physical chemistry – thermodynamics	Fall and Spring
CHEM 452 ²	Physical chemistry – quantum chemistry	Fall and Spring
MICRB 401 ¹	Microbial physiology and structure	Fall only
MICRB 412 ¹	Medical microbiology	Spring Only
MICRB 415 ²	General virology: bacterial and animal viruses	Spring Only
VB SC 403 ²	Principles of animal disease control	Fall only
VB SC 430 ²	Principles of toxicology	Fall only
BIOL 141	Introductory physiology	All semesters
BIOL 142 ²	Physiology laboratory	Fall and Spring

Interest in Nutrition & Public Policy

NUTR (HIST) 111	American food system: history/technology and culture	Fall only
NUTR 320 ²	Science and methods of food preparation	Fall and Spring
NUTR (US, IL) 421 ²	Food culture and health trends	Spring Only
NUTR (IL) 430	Global food strategies; problems/prospects of world hunger	Fall only
NUTR 451 ²	Nutrition throughout the life cycle	Fall and Spring
NUTR 452 ²	Nutritional aspects of disease	Fall and Spring
PL SC 460 ¹	Science, technology, and public policy	Fall only
R SOC (AGECO) 134	Sustainable agriculture science and policy	Fall only

¹Prerequisites covered by the first 2 years of FDSC (if following RAP)

²Prerequisites needed before eligible for course

Interest in Sensory, Sociology, and Psychology

PSYCH 100	Introduction to psychology	All semesters
ANTH 140 (US/IL)	Anthropology of alcohol	Fall only
PSYCH 221 ²	Introduction to social psychology	Fall and Spring
PSYCH 253 ²	Introduction to the psychology of perception	Fall and Spring
PSYCH 260	Neurological bases of human behavior	All semesters
PSYCH 451 ²	Psychology of action	Spring only
PSYCH 462 ²	Physiological psychology	Fall & Spring

Interest in Technology and Engineering

CMPSC 101 ¹	Introduction to C++ programming	All semesters
IST 210 ²	Organization of data	All semesters
MATH 111 ¹	Techniques of calculus II	All semesters
MATH 141 ²	Calculus with analytic geometry II	All semesters
MATH 251 ²	Ordinary and partial differential equations	All semesters
EMCH 210 ²	Statics and strength of materials	Fall & Spring
BE 301 ²	Mathematical modeling of biological/physical systems	Fall only
BE 304 ²	Engineering properties of food and biological materials	Fall only

¹Prerequisites covered by the first 2 years of FDSC (if following RAP)

²Prerequisites needed before eligible for course

Personalize Your Degree

There may be additional subjects of significant interest to you besides Food Science. While career interest courses can help customize your major, there are many other ways to make our program ideal for you! Below are just a few of the opportunities available to you as a Penn State Student.

Minors

Minors are the easiest way to add another element to your academic experience. With prior advisor approval, courses taken towards a minor may also be counted as supporting courses for our major. Thus, students can easily achieve a minor with the food science program in four years. While any minor is possible to acquire, the list below has some minors that are relevant and helpful in the realm of food science. If interested in a minor, students should explore the department webpage for the minor, and the University Bulletin (<http://bulletins.psu.edu/undergrad/programs/minors/>), and then talk to their advisor. The following minors may be of interest to Food Science students:

College of Agricultural Sciences

- Agribusiness Management
- Agricultural Communications
- Agricultural Economics and Rural Sociology
- Agricultural Systems Management
- Agronomy
- Animal Sciences
- Arboriculture
- Biological Engineering
- Entrepreneurship and Innovation
- Environmental and Renewable Resource Economics
- Environmental Resource Management
- Environmental Soil Science
- Horticulture
- International Agriculture
- Leadership Development
- Mushroom Science and Technology
- Plant Pathology
- Poultry and Avian Science
- Youth and Family Education

College of Earth and Mineral Sciences

- Polymer Science

College of Engineering

- Biological Engineering
- Biomedical Engineering
- Engineering Leadership Development

College of Health and Human Development

- Nutritional Sciences

Eberly College of Science

- Biochemistry and Molecular Biology
- Biology
- Chemistry
- Microbiology

College of Liberal Arts

- Psychology
- Language Minors (Spanish, French, etc.)

Concurrent (Double) Major

Some students find two degrees equally intriguing and decide to double major. Completion of two majors in four years can be challenging unless the second major has prerequisite requirements similar to the food science major. Depending on the other major, the credits required for graduation could necessitate additional semesters before graduation. If interested in a second major, students should notify their advisors immediately or during their initial meeting in order to plan accordingly. The following degrees may be of interest to Food Science Students:

- Agribusiness Management
- Agricultural Education
- Animal Science
- Biological Engineering
- Environmental Resource Management

- Nutrition (College of Health and Human Development)
- Biological Engineering (College of Engineering)

Study Abroad

Students are often interested in spending a semester abroad. Due to the specificity of classes in the Food Science degree, it is difficult to study abroad and graduate in four years. If interested in this option, consider going abroad sophomore year (while still taking mostly general education courses) and plan accordingly. Other options include pairing the study abroad with a 6 month co-op work experience, or finding specific abroad experiences that provide food science classes which are suitable substitutes to courses required by the program. In addition, shorter length international programs are available during spring break, thanksgiving break, and summers. Anyone interested in a study abroad experience should speak with their advisor and Ms. Ketja Lingenfelter, the College of Agricultural Sciences Education Abroad Advisor, at 122 Agricultural Administration Building or kmw209@psu.edu. For information on other students and study abroad opportunities available, you can visit the College of Agricultural Sciences Study Abroad Programs website (<http://agsci.psu.edu/international/study-abroad/study-abroad/current/semester-abroad-by-major/food-science>).

Embedded Programs in FDSC

The FDSC program has a trip to Italy, FDSC 460, where students learn about food production and processing systems abroad, and compare them to the US system. The course takes a trip to Northern Italy over spring break, to tour production facilities and processing plants. The students research food products unique to regions in Italy, and present them on the trip before touring a region where that food is produced. The course is offered every odd year in Spring.

A second embedded program is offered every odd year in Fall, FDSC 499, which travels to India over Thanksgiving break. A class is attached that meets once a week before the trip, where students learn about the Indian food system, and work together on projects related to the culture and food in India.

Spanish for the Agricultural Sciences

This program, unique to the College of Agricultural Sciences, is a three-course sequence developed for students whose future involves working in management positions in agricultural industries such as mushroom production, dairy, animal sciences, and poultry. The sequence includes a five-week trip to Costa Rica in May, where they will practice Spanish and learn about the local agricultural system. The program also has an internship attached, where students will use their knowledge and Spanish to work in the industry. Interested students should begin researching this program early so that they can plan their travel around their major required classes. <http://agsci.psu.edu/international/study-abroad/study-abroad/embedded-courses/spanish-in-agriculture-courses-and-immersion-experience>

Internships and Co-op Opportunities

The Food Science Department at PSU has many contacts in the food and beverage industry. Because of these connections, many companies come to the department for recruitment. Internships (summer-long work experiences) and Co-ops (6 month semester-long work experiences) are frequently offered to our students after a company visit. These visits are often 2 days long, with a presentation by the company (often during a Food Science Club meeting) on the first day, and interviews conducted on the second day. Students are asked to have their resumes and cover letters sent to the department in advance of the company visit. Companies who have visited in the past include Hershey's, Mondelez International, Ecolab, Ocean Spray Cranberries, Campbell's Soup, and Smucker's.

WHAT DO STUDENTS GAIN?

During these experiences, a student will have an opportunity to work in the industry, and see the direct application of some of the things they learn in class. It is recommended that students between their junior and senior year get an internship, in order to better prepare them for the industry, and to give the student more insight into what they want to do with their major. A student can come out of a four year degree having 6 months of applicable experience with two summers worth of work at two different companies. Not only is the experience invaluable, but these internships and co-ops can develop into full-time positions upon graduation.

Companies look for many things in candidates, including personality fit and interest in their specific products. However, students with high GPAs and research experience, as well as leadership positions in extracurricular activities, have a greater likelihood of being selected for these positions. **For internship success stories, check out the links below!**



2015 Graduate, Paige Smoyer - Internship at Food Directions LLC

Paige helped Food Directions LCC counsel update a client from Canada about changing regulations, and attended many FDA and Agricultural Senate Committee meetings as a part of her internship!

<http://news.psu.edu/story/362038/2015/07/01/student-stories-food-science-major-has-impressive-internship>



2017 Graduate, Evan Azzara - Internship at Turkey Hill Dairy

Evan worked to create new ice cream flavors and troubleshoot processing problems in the test kitchen of Turkey Hill Dairy during his summer internship!

<http://news.psu.edu/story/428069/2016/09/27/academics/contacts-ag-career-day-lead-food-science-major-internship>

Financial Aid

Various sources of financial aid are available to Penn State students, whether they are enrolled at University Park or at a commonwealth campus. This financial aid includes federally funded grants, loans and work-study support, such as Pell Grants, National Defense Student Loans and the College Work Study Program. In addition, state-funded grants and loans can be obtained through the Pennsylvania Higher Education Assistance Agency (PHEAA), as well as through the University. Detailed information on financial aid can be found in the Office of Student Aid, 314 Shields Building, or on the Office of Student Aid website: <http://studentaid.psu.edu>.

DON'T MISS OUT!

Financial assistance information for students in the College of Agricultural Sciences can be accessed at the College's website, <http://agsci.psu.edu/students/scholarships>. These scholarships are the most common scholarships for students in food science. Note that there is just one application for the many College and Department level scholarships. To be eligible for need-based sources of College and Departmental financial support, a FAFSA (Free Application for Federal Student Aid) form **must be on file** with the University (you do not need to file a copy of your FAFSA with the College). The scholarship application is due to the department by **April 30th** for the upcoming academic year, and is filled out online. It can be found at the link above.

In addition, a number of competitive national scholarships sponsored by the Institute of Food Technologists and other national groups are awarded annually, including incoming students pursuing a Bachelor of Science degree in Food Science. More information about these scholarships can be accessed at www.ift.org/scholarships

Food Science Club

The Food Science Club is a club hosted by the department for professional development, run by the students themselves. It is a great way to meet other Food Science students on campus! The Food Science Club hosts many companies, who present information about their industries and recruit students for both internships and full-time jobs. Meetings start at 5:30pm on Monday evenings, and are usually finished by 7:30pm. Dinner is included if student fees are paid (\$10 for the year, \$7 for a semester). When the Food Science Club isn't hosting companies, they have many other activities, including a Food Science Tailgate, Pumpkin Carving, Gingerbread House Competitions, Chopped-style cooking competitions, Pizza-making days, and Baking for THON. The club also leads to other social activities, such as a FDSC Club Intramural Soccer team, and get-togethers throughout the semester.

If interested, please contact the current president of the Food Science Club, Kerry Smith, at kds5445@psu.edu. The picture above is club members enjoying making gingerbread houses!



Food Science College Bowl Team

College Bowl is a fun and fast-paced food science trivia competition run by the student division of IFT. Open to undergraduate and graduate students at all levels, it is a great way to meet food science students from other universities, reinforce food science knowledge, and learn some wacky facts along the way. Team members get to travel across the country to compete in regional and national events, culminating in the championship held at the annual IFT meeting. The winning team will take home the prize money, but everyone comes away richer for the experience.

To quote the Institute of Food Technologist's description, "the objectives of this competition are to facilitate interaction among students from different universities, to stimulate student's desires to accumulate and retain knowledge, and to provide a forum for universities to engage in friendly competition – in other words – to have a good time." Above is a picture of our Grand Champion team from 2017!



From Left to Right: Xiaoqing Tan, Vijay Varma Indukuri, Jaye Aster Broder, Venkata Charepalli, & Lisa Caprera (Team Captain)

Food Science Product Development Team

Every year, undergraduate and graduate students in the Department of Food Science compete in product development competitions hosted by various industry and professional organizations. Product development competitions give food science students the opportunity to highlight their creativity and extensive knowledge of the field by developing and marketing novel food products. These competitions also provide extensive networking opportunities for students with industry that has helped advertise and promote our program in recent years.

In 2013 a group of our students entered the National Dairy Council competition for the first time and took first place with their dairy-based muffin product, Mooofins. The product was further developed after the competition and the rights to Mooofins were signed over to a major dairy company. This company then donated funds that created an endowment for the department, which are utilized to support product development teams. The Mooofins team generated local, state and national media recognition for the department.



Mooofins: Winning product in NDC Competition 2013

This year our students entered competitions hosted by the Institute of Food Technologists (Mars and Disney competitions), Ocean Spray, Ag Springboard, and The National Dairy Council. All 5 team's advanced from the preliminary rounds to the finals. Their success is a remarkable feat considering the majority of these competitions have 25+ entries



Snow White's Apple Delights: Grand Prize winning product in IFTSA Disney Competition 2017

taking home the 1st place prize. FüZen is a dairy-based beverage with unique dual-bottle packaging designed to support the on-the-go, healthy lifestyle of moderately active young adults. People have the option of drinking two flavors, chocolate-coconut and vanilla-cardamom, from each 8-ounce side individually or together depending on their preference or nutrition needs throughout the day.

from world class food science programs! *Snow White's Apple Delights* won the competition, taking home the Grand prize in the IFT Disney competition. Snow White's Apple Delights are a gluten-free, apple pomace wafer sandwich with a middle layer of apple and pear fruit leather strips, providing excellent nutritional benefits while emphasizing the importance of minimizing food waste.

FüZen won the National Dairy Council competition,



FüZen: Winning product in NDC Competition 2017



Cado Cakes: Top 6 Finalist in IFTSA MARS Competition 2017

Cado cakes received Honorable mention after placing in top 6 in the finals round for the IFTSA MARS competition. Cado cakes are a plant based snack or dessert inspired by the traditional Chinese mooncake dessert. This healthy yet indulgent treat utilizes avocado pits to enhance the product's creaminess while adding beneficial vitamins and minerals and contributing to sustainability of the avocado industry.

Pasta 2050 took home the 1st place prize as the winning product of the Ag Springboard competition. Pasta 2050 was developed to help westerners warm up to eating crickets by fortifying pasta, a familiar staple product, with cricket flour. The insects are a source of high-quality protein that can help to feed a growing, global population.



Pasta 2050: Winning product in Ag Springboard Competition 2017

Our student's success in product development competitions has helped pave the way for growth and success for future teams. The impact from previous team's successes is evident this year as we currently have 3 winning teams and 2 in the finals for 5 different competitions! Students have also donated portions of their winnings to create funds for future product development! We hope to be greeted with even better news of more success this year and look forward to having our students represent our department at competitions around the country this summer. If interested in being part of a product development team, contact the current staff advisor, Jared Smith, at jcs5324@psu.edu . Below are just a few photos of some of our recent award-winning student teams! For more information on other clubs & organizations in the College of Agricultural Sciences, please visit <http://agsci.psu.edu/students/activities/>!

Department Faculty and Staff

Department Head:

Robert F. Roberts, Ph.D. (University of Minnesota) Department Head and Professor of Food Science. Technology of dairy products processing. Email address: rfr3@psu.edu

Undergraduate Program Coordinator:

John N. Coupland, Ph.D. (University of Leeds) Professor of Food Science and Undergraduate Program Coordinator. Physical chemistry of foods. Food emulsions and biopolymers and their behavior during processing. Ultrasonic sensors. Email address: jnc3@psu.edu

Undergraduate Teaching Faculty:

Rania Agil, Ph.D. (Carleton University) Instructor of Food Science. Analytical and free radical chemistry of foods. Email address: rx231@psu.edu

Ramaswamy C. Anantheswaran, Ph.D. (Cornell University) Professor of Food Science. Microwave processing of foods; Dielectric properties of food materials; Ingredient interactions during microwave heating of foods; Moisture and fat migration in confectionery products; Modified atmosphere and modified humidity packaging of fresh produce; Rapid cooling of shell eggs. Email address: rca3@psu.edu

C. Daniel Azzara, Ph.D. (Pennsylvania State University) Alan R. Warehime Professor of Agribusiness. Email address: cxa22@psu.edu

Edward G. Dudley, Ph.D. (University of Wisconsin) Associate Professor of Food Science. Molecular biology and genomics of foodborne pathogens. Mechanisms of environmental survival and pathogenicity of *Escherichia coli* O157:H7 and enteroaggregative *Escherichia coli*. Molecular biology methods of detecting and characterizing bacteria in food. Email address: egd100@psu.edu

Ryan J. Elias, Ph.D. (University of Massachusetts) Frederik Sr. and Faith E. Rasmussen Professor of Food Science, Associate Professor of Food Science. Free radical chemistry of foods: Metal-catalyzed lipid and protein oxidation in complex foods; development and evaluation of novel antioxidants; oxidative stability of wine and beer. Email address: rje12@psu.edu

Hassan Gourama, Ph.D. (University of Nebraska) Associate Professor of Food Science (Berks Campus). Significance of molds and mycotoxins in foods: Identification of molds, mold growth and mycotoxin production, control of mold contaminants and development of rapid detection methods for molds. Occurrence and control of bacterial pathogens in foods. Email address: hxg7@psu.edu

Federico Harte, Ph.D. (Washington State University) Associate Professor of Food Science. Research focuses on: the structure-function properties of milk proteins, with a strong emphasis on casein proteins and non-thermal technologies for fluid foods: valve homogenization. Email address: fmh14@psu.edu

John Hayes, Ph.D. (University of Connecticut) Associate Professor of Food Science. Flavor perception, behavioral genetics and food choice; impact of genetic variation on sensation and reward; understanding factors that influence consumption of food or beverages with potential health impact; acquisition of preference for initially aversive stimuli (chiles, coffee, alcohol). Email address: jeh40@psu.edu

Kathleen L. Keller, Ph.D. (Rutgers University) Assistant Professor of Nutritional Sciences and Food Science. Eating behaviors in children; neural mechanisms of taste preference and eating behaviors in children; food marketing and childhood obesity; genetic and neural influences in taste in children. Email address: klk37@psu.edu

Jasna Kovac, Ph.D. (University of Ljubljana) Assistant Professor of Food Science. Precision food safety supported by (meta)genomics. Transmission and evolution of pathogens and antimicrobial resistance in the food supply chain. Characterization of virulence factors and antimicrobial resistance determinants in foodborne pathogens. Focus on Campylobacter, Salmonella, Bacillus cereus group. Email address: jzk303@psu.edu

Joshua D. Lambert, Ph.D. (University of Arizona) Associate Professor of Food Science. Prevention of obesity, fatty liver disease, and cancer by dietary phytochemicals. Potential toxicities of high dose dietary polyphenols. Bioavailability and biotransformation of dietary phytochemicals. Email address: jdl134@psu.edu

Edward Mills, Ph.D. (Purdue University) Associate Professor of Meat Science. Meat composition and processing with emphasis on prerigor processing techniques. Email: ewm3@psu.edu

Jairam Vanamala, Ph.D. (Texas A&M University) Associate Professor of Food Science. Food processing effects on anti-inflammatory/anti-cancer properties of foods; obesity and cancer prevention; extraction of health-benefiting extracts/compounds from agricultural/green energy industry byproducts. Email address: juv4@psu.edu

Gregory R. Ziegler, Ph.D. (Cornell University) Professor of Food Science. Graduate Program Coordinator. Foods as composite materials. Physical properties and processing of polymeric and particulate foods, with an emphasis on chocolate and confectionery products. Email address: grz1@psu.edu

Graduate Teaching and Extension Faculty in the Department:

Darrell Cokburn, Ph.D. (University of Guelph) Assistant Professor of Food Science. Processing of dietary fiber, particularly resistant starch, by the human gut microbiome. Microbial ecology of the gut as it relates to fiber digestion. Biochemical and structural investigation of microbial fiber degrading enzymes. Email Address: dwc30@psu.edu

Catherine N. Cutter, Ph.D. (Clemson University) Professor of Food Science. Processing and manufacturing of muscle foods with an emphasis on food safety; pathogen reduction, application of antimicrobials or interventions to muscle foods; understanding the mechanisms of bacterial attachment to muscle foods. Email address: cnc3@psu.edu

Helene Hopper, Ph.D. (Graz University of Technology) Rasmussen Career Development Professor in Food Science, Assistant Professor of Food Science. How the chemical composition of food and non-food impacts human perception, particularly aroma and flavor. Email Address: hvh83@psu.edu

Kerry E. Kaylegian Ph.D. (Cornell University) Dairy Research & Extension Associate. Provides technical support and outreach programs to improve the safety and quality of value-added dairy products. International cheese and dairy product judge, and coach of the Penn State Collegiate Dairy Products Evaluation Team. Email address: kek14@psu.edu

Luke LaBorde, Ph.D. (University of Wisconsin) Professor of Food Science. Quality and safety of minimally processed and shelf-stable fruits and vegetables. Development of food safety extension programs for fruit, vegetable, and mushroom producers. Email address: lf15@psu.edu

Staff Members who work with Undergraduate Students:

Kira Wetzel, Undergraduate Program Assistant

Kira Wetzel is your primary contact for all things related to the program and if she can't answer your question, she can direct you to someone who can. She also handles various administrative tasks including academic exception petitions & independent study forms.

Email address: klw5304@psu.edu

Marielle Donohue, Undergraduate Student Assistant

Marielle is a senior in Food Science student and the ideal person to contact for a student's perspective on the program! She works at the front desk part-time, assists with schedule building, LionPath navigation, and answers general questions about the program.

Email address: mjd5725@psu.edu

Jared Smith, Instructional Laboratory Support Specialist

Jared Smith is a graduate of the Penn State Food Science program. He ensures everything runs smoothly in the teaching lab/pilot plant and serves as the advisor for our Food Product Development teams and the Food Science Club. If you have questions about lab equipment or questions regarding the pilot plant (including scheduling time to use it), he is a great person to ask!

Email address: jcs5324@psu.edu

Tiffany Murray, Sensory Coordinator

Tiffany runs the Sensory Evaluation Center (SEC), helping with student sensory projects, as well as hiring undergraduate students to help in the Sensory Evaluation Center. She supervises, trains, and oversees all students in the program who work or research in the sensory evaluation center, and is a great resource for getting involved in the SEC.

Email address: tmw5291@psu.edu

Lori Connelly, Coordinator of Experiential Learning and Career Services, College of Agricultural Sciences.

In addition to speaking with your advisor, Ms. Connelly is a resource to turn to with any questions regarding professional development. She is a valuable resource if you are looking to get help constructing your resume or need to brush up on your interview skills.

Email address: llc143@psu.edu

Alyssa Bumbaugh, Ph.D. Senior Undergraduate Programs Coordinator for the College of Agricultural Sciences.

Dr. Bumbaugh is the person to turn to for a better understanding the College of Agricultural Sciences and if you are interested in other majors in the College. She is also very knowledgeable about the programs available for freshmen.

Email address: acb134@psu.edu

For a detailed list & photos of our faculty & staff, visit: <http://foodscience.psu.edu/directory/faculty>

Food Science Building

The Rodney A. Erickson Food Science Building, on the corner of Curtin and Bigler Rd., is also home to the Berkey Creamery. It is conveniently located next to the East Parking Deck. The Food Science Building is the food scientist major's home-base. With the Creamery downstairs, and the undergraduate study lounge on the second floor, it is a great place to study between classes. Food Science research happens on the 3rd and 4th floors of this building. The floor-plan of each floor is below. *Note: the undergraduate lounge near the main office on the second floor!* The Keeney Commons (Floor 2) also has open seating (chairs and tables) available. On Floors 3 and 4, various tables are available outside of offices for studying as well.

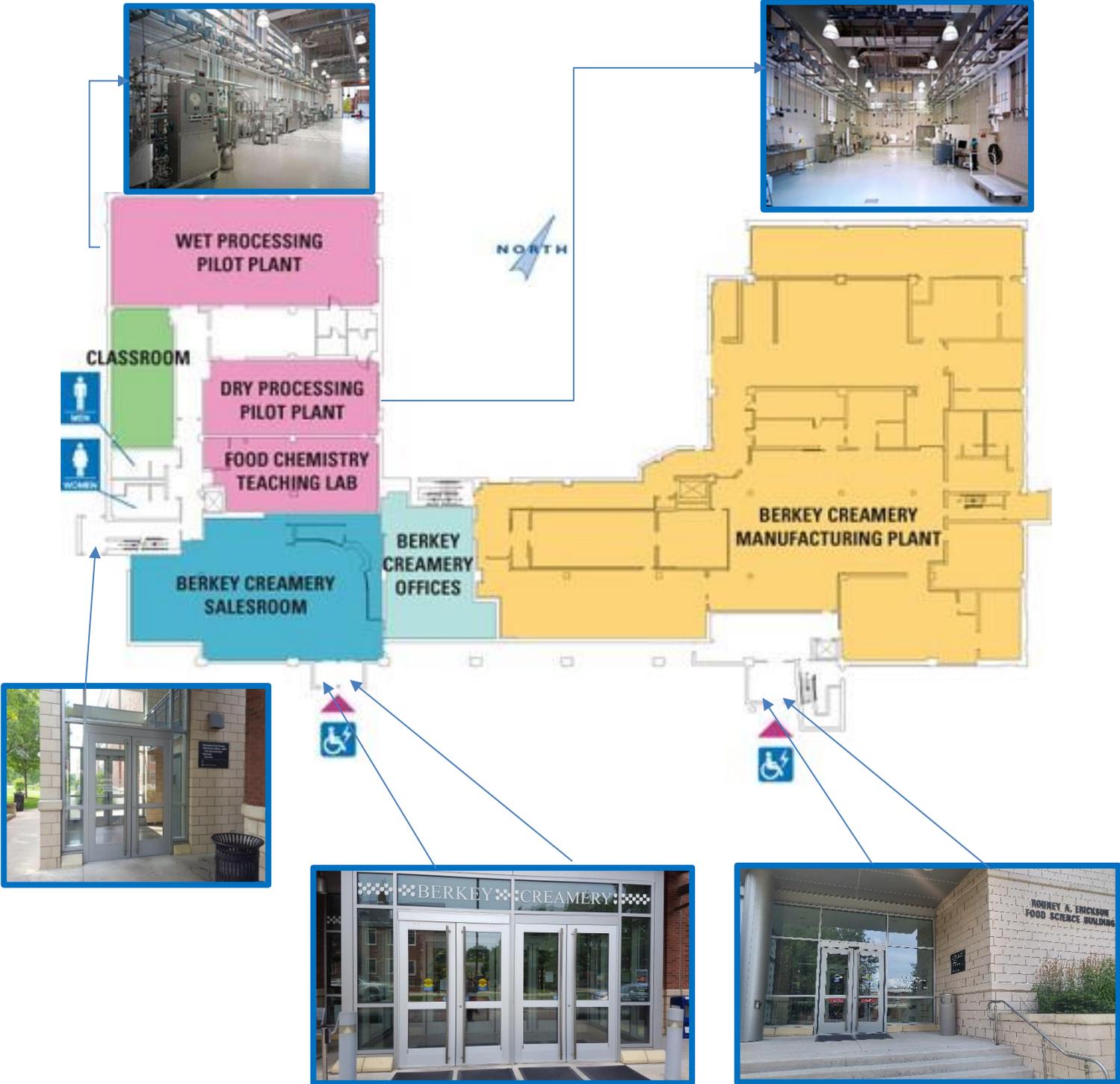


3rd and 4th Floor:
Faculty Offices
Graduate Student Offices
Faculty Research Labs

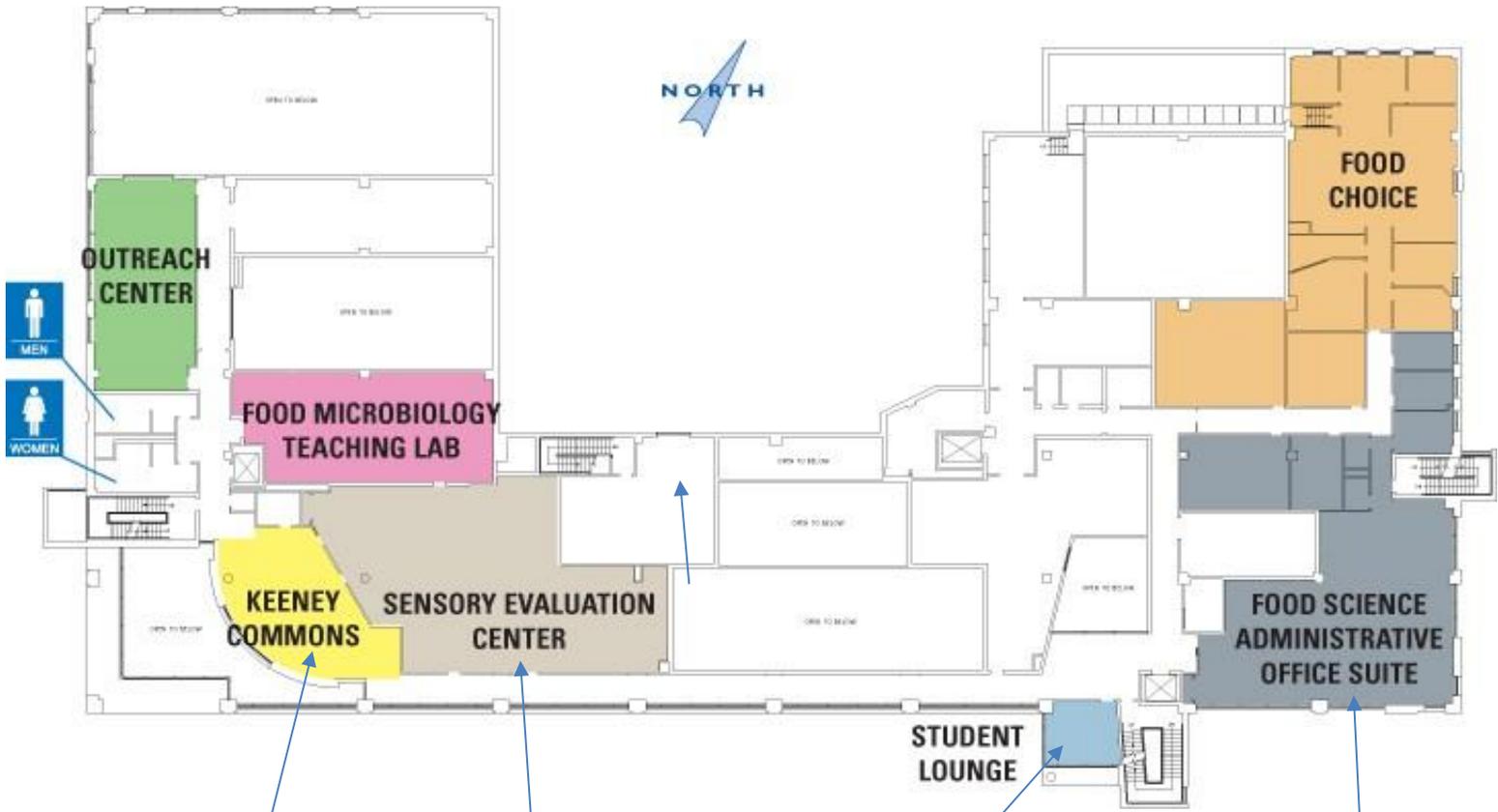
2nd Floor:
Sensory Evaluation Center
Keeney Commons

1st Floor:
Berkey Creamery
Pilot Plant Teaching

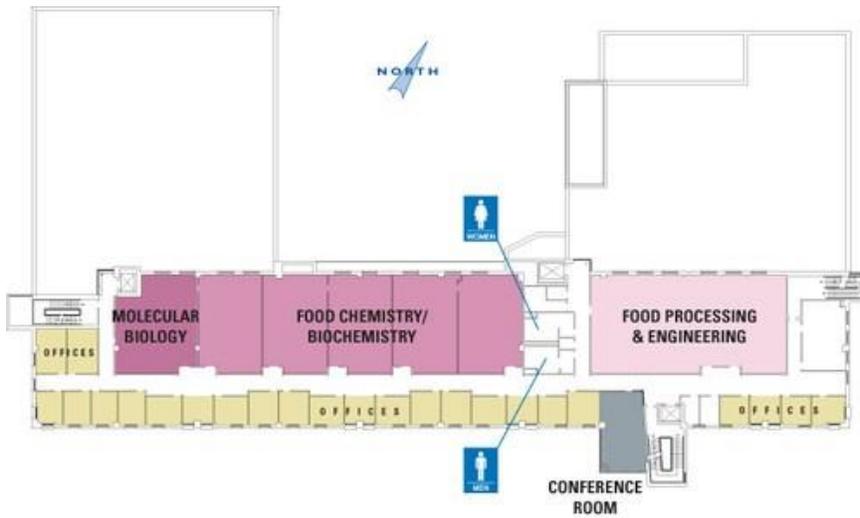
1st FLOOR



2nd FLOOR

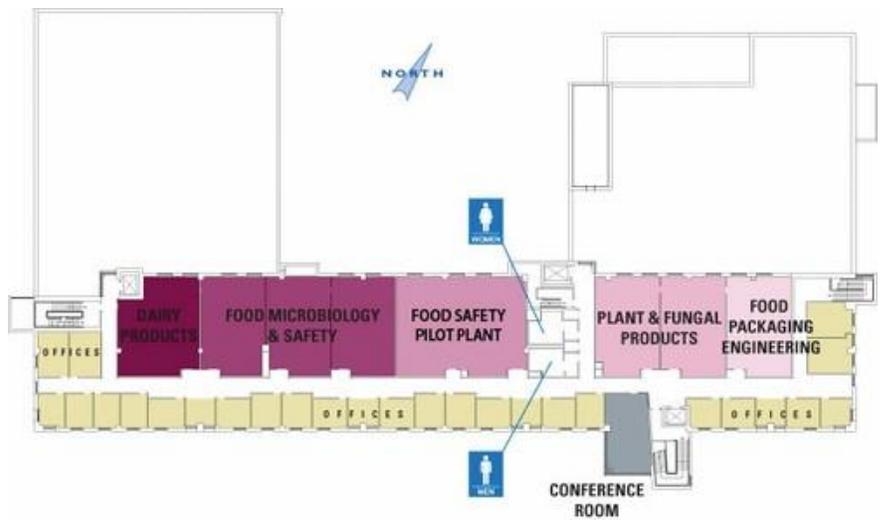


3rd FLOOR



The 3rd and 4th floors are for faculty offices, graduate student offices, and their respective labs.

4th FLOOR



Contact Us!

For further information about the Food Science Major contact:

Dr. John N. Coupland
Undergraduate Program Coordinator
337 Rodney A. Erickson Food Science Building
University Park, PA 16802
Email: jnc3@psu.edu

Or visit the Food Science Department at: <http://www.foodscience.psu.edu>

The University is committed to equal access to programs, facilities, admission, and employment for all persons. It is the policy of the University to maintain an environment free of harassment and free of discrimination against any person because of age, race, color, ancestry, national origin, religion, creed, service in the uniformed services (as defined in state and federal law), veteran status, sex, sexual orientation, marital or family status, pregnancy, pregnancy-related conditions, physical or mental disability, gender, perceived gender, gender identity, genetic information, or political ideas. Discriminatory conduct and harassment, as well as sexual misconduct and relationship violence, violates the dignity of individuals, impedes the realization of the University's educational mission, and will not be tolerated. Direct all inquiries regarding the nondiscrimination policy to Dr. Kenneth Lehrman III, Vice Provost for Affirmative Action, Affirmative Action Office, The Pennsylvania State University, 328 Boucke Building, University Park, PA 16802.

The 2017 Undergraduate Program Handbook has been brought to you by Dr. Rania Agil and Marielle Donohue on behalf of the Department of Food Science at The Pennsylvania State University!