Date Submitted: 10/31/19 8:34 am

Viewing: FDSCBS : Food Science, Bachelor of Science in Agri Food & Life Sciences

Last edit: 12/05/19 1:33 pm

Changes proposed by: hamilton

Catalog Pages Using this Program

Food Science (FDSC)

Submitter: User ID: **hamilton** Phone: **479-575-5299**

Program Status **Active**

Academic Level Undergraduate

Type of proposal **Minor**

Select a reason for this modification

Making Minor Changes to an Existing Degree (e.g. changing 15 or fewer hours, changing admission/graduation requirements, adding/changing Focused Study or Track)

Effective Catalog Year Fall 2020

College/School Code

Bumpers College of Agricultural, Food, and Life Sciences (AFLS)

Department Code

Department of Food Science (FDSC)

Program Code FDSCBS

Degree Bachelor of Science in Agricultural, Food & Life Sciences

CIP Code

In Workflow

1. **AFLS Dean Initial**
2. **Director of Program Assessment and Review**
3. **Registrar Initial**
4. **Institutional Research**
5. **FDSC Chair**
6. **FDSC Curriculum Committee**
7. **AFLS Faculty**
8. **ARSC Dean**
9. **AFLS Dean**
10. **Global Campus**
11. **Provost Review**
12. **University Course and Program Committee**
13. Faculty Senate
14. Provost Final
15. Provost's Office--Notification of Approval
16. Registrar Final
17. Catalog Editor Final

Approval Path

1. 10/31/19 8:55 am Lona Robertson (ljrobert): Approved for AFLS Dean Initial
2. 11/05/19 11:21 am Alice Griffin (agriffin): Approved for Director of Program

Assessment and Review
3. 11/05/19 1:27 pm Lisa Kulczak (lkulcza): Approved for Registrar Initial
4. 11/06/19 10:04 am Gary Gunderman (ggunderm): Approved for Institutional Research
5. 11/11/19 11:53 am Jeyamkondan Subbiah (jsubbiah): Approved for FDSC Chair
6. 11/14/19 2:29 pm Gary McDonald (gmcdonal): Approved for FDSC Curriculum Committee
7. 11/15/19 5:57 pm Michael Thomsen (mthomsen): Rollback to FDSC Curriculum Committee for AFLS Faculty
8. 12/05/19 1:34 pm Gary McDonald (gmcdonal): Approved for FDSC Curriculum Committee
9. 12/12/19 8:57 am Michael Thomsen (mthomsen):

Approved for AFLS Faculty
10. 12/12/19 11:46 am Jeannie Hulen (jhulen): Approved for ARSC Dean
11. 12/12/19 1:43 pm Lona Robertson (ljrobert): Approved for AFLS Dean
12. 12/16/19 11:24 am Suzanne Kenner (skenner): Approved for Global Campus
13. 01/14/20 3:32 pm Terry Martin (tmartin): Approved for Provost Review

01.1001 - Food Science.

Program Title

Food Science, Bachelor of Science in Agri Food & Life Sciences

Program Delivery Method

On Campus

Is this program interdisciplinary?

No

Does this proposal impact any courses from another College/School?

Yes

College(s)/School(s)

College/School Name
Fulbright College of Arts and Sciences (ARSC)

What are the total hours needed to complete the program?

120

Program Requirements and Description

Requirements

Requirements for a Major in Food Science (FDSC)

State minimum core and discipline specific general education requirements:
(Course work that meets state minimum core requirements is in bold.)

~~Communication (6-12 hours)~~

Communication (12 hours)		**12**
ENGL 1013	Composition I (ACTS Equivalency = ENGL 1013)	
ENGL 1023	Composition II (ACTS Equivalency = ENGL 1023)	
~~Select two courses from approved list of communication intensive courses (FDCU must choose 3000-4000 level courses)~~		~~6~~
Select two courses from approved list of communication intensive courses		
U.S. History and Government (3 hours)		3
~~Select one U.S. History Core courses~~		~~3~~
~~Mathematics and Statistics (9-13 hours)~~		
Select 3 hours US History from University Core		
Mathematics and Statistics (6 hours)		6
MATH 1203	College Algebra (ACTS Equivalency = MATH 1103)	
~~FDSC Concentration:~~		~~10~~
~~MATH 1213~~	~~Plane Trigonometry (ACTS Equivalency = MATH 1203)~~	
~~MATH 2554~~	~~Calculus I (ACTS Equivalency = MATH 2405)~~	
STAT 2303	Principles of Statistics (ACTS Equivalency = MATH 2103)	
~~STAT 2023~~	~~Biostatistics~~	
~~AGST 4023~~	~~Principles of Experimentation~~	
~~FDTN Concentration:~~		~~6-9~~
~~MATH 2043~~	~~Survey of Calculus (ACTS Equivalency = MATH 2203)~~	
~~MATH 2053~~	~~Finite Mathematics (for students declaring Agricultural Business or General Business minors only)~~	
Physical and Biological Sciences (23-27 hours)		**23-27**
BIOL 1543	Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture)	
& BIOL 1541L	and Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)	
BIOL 2013	General Microbiology (ACTS Equivalency = BIOL 2004 Lecture)	
& BIOL 2011L	and General Microbiology Laboratory (ACTS Equivalency = BIOL 2004 Lab)	
CHEM 1103	University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture)	
& CHEM 1101L	and University Chemistry I Laboratory (ACTS Equivalency = CHEM 1414 Lab)	

CHEM 1123	University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture)	
& CHEM 1121L	and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)	
~~Select one of the following concentrations:~~		
~~FDSC Concentration:~~		~~11-15~~
CHEM 3813	Elements of Biochemistry	
~~PHYS 2013~~	~~College Physics I (ACTS Equivalency = PHYS 2014 Lecture)~~	
~~& PHYS 2011L~~	~~and College Physics I Laboratory (ACTS Equivalency = PHYS 2014 Lab)~~	
~~FDTN Concentration:~~		~~4-7~~
~~CHEM 2613~~	~~Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture)~~	
~~& CHEM 2611L~~	~~and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)~~	
~~CHEM 3813~~	~~Elements of Biochemistry (for students declaring General Foods and Nutrition minor only)~~	
~~FDCU Concentration:~~		~~4~~
~~CHEM 2613~~	~~Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture)~~	
~~& CHEM 2611L~~	~~and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)~~	
CHEM 2613	Organic Physiological Chemistry (ACTS Equivalency = CHEM 1224 Lecture)	
& CHEM 2611L	and Organic Physiological Chemistry Laboratory (ACTS Equivalency = CHEM 1224 Lab)	
or CHEM 3603	Organic Chemistry I	
& CHEM 3601L	and Organic Chemistry I Laboratory	
& CHEM 3613	and Organic Chemistry II	
& CHEM 3611L	and Organic Chemistry II Laboratory	
Fine Arts and Humanities (6 hours)		6
Select 3 hours Fine Arts from University Core		
~~AGEC 2403~~	~~Quantitative Tools for Agribusiness~~	
~~WCOB 1033~~	~~Data Analysis and Interpretation~~	
~~STAT 2303~~	~~Principles of Statistics (ACTS Equivalency = MATH 2103)~~	
~~AGST 4023~~	~~Principles of Experimentation~~	
~~FDCU Concentration:~~		~~6~~
~~MATH 2043~~	~~Survey of Calculus (ACTS Equivalency = MATH 2203)~~	
~~STAT 2303~~	~~Principles of Statistics (ACTS Equivalency = MATH 2103)~~	
~~Physical and Biological Sciences (20-31 hours)~~		
Select 3 hours Humanities from University Core		
~~FDSC Degree Requirements (26 hours)~~		
Social Sciences (9 hours)		9
~~Select three Social Science Core courses~~		~~9~~
Select 9 hours Social Sciences from University Core		

University Requirement (1 hr)		**1**
UNIV 1001	University Perspectives	
FDSC Degree Requirements (32 hours)		**32**
FDSC 1011	Exploring Topics in Food Science	
FDSC 1103	Introduction to Food Science	
FDSC 2523	**Sanitation and Safety in Food Processing Operations**	
FDSC 3103	Principles of Food Processing	
FDSC 3202	Introduction to Food Law	
FDSC 4113	Food Analysis	
& FDSC 4111L	and Food Analysis Lab	
FDSC 4122	**Food Microbiology**	
& FDSC 4121L	**and Food Microbiology Lab**	
FDSC 4304	Food Chemistry	
FDSC 431V	Internship in Food Science	
FDSC 4413	Sensory Evaluation of Food	
FDSC 4713	Product Innovation for the Food Scientist	
~~General Electives (9-19 hours)~~		~~9-19~~
21 hours from concentration requirements (FDSC, FDCU, FDTN)		**21**
General Electives		**3-7**
Total Hours		120

8-Semester Plan

Are Similar Programs available in the area?

No

Estimated Student Demand for Program **NA**

Scheduled Program Review Date **2022-2023**

Program Goals and Objectives

Program Goals and Objectives
1. Graduates are competent in core areas of food science.
2. Graduates can integrate and apply their knowledge.
3. Graduates are proficient communicators.
4. Graduates demonstrate professionalism and leadership skills

Learning Outcomes

Learning Outcomes

FDSC currently adheres to standards and learning outcomes approved by the Higher Education Review Board (HERB) of the Institute of Food Technologists (IFT) for undergraduate programs in Food Science and Technology. They are as follows:

Standard: Food chemistry (FC) - The structure and properties of food components (water, carbohydrates, protein, lipids, other components and food additives); the chemistry of changes occurring during processing, storage, and utilization.
Essential Learning Outcomes:
FC.1. Discuss the major chemical reactions that limit shelf life of foods.
FC.2. Explain the chemistry underlying the properties and reactions of various food components.
FC.3. Apply food chemistry principles used to control reactions in foods.
FC.4. Demonstrate laboratory techniques common to basic and applied food chemistry.
FC.5. Demonstrate practical proficiency in a food analysis laboratory.
FC.6. Explain the principles behind analytical techniques associated with food.
FC.7. Evaluate the appropriate analytical technique when presented with a practical problem.
FC.8. Design an appropriate analytical approach to solve a practical problem.

Standard: Food microbiology (FM) - Microorganisms in food including beneficial, pathogenic, and spoilage; the influence of the food system on their growth, survival, and control.
Essential Learning Outcomes:
FM.1. Identify relevant beneficial, pathogenic, and spoilage microorganisms in foods and the conditions under which they grow.
FM.2. Describe the conditions under which relevant pathogens are destroyed or controlled in foods.
FM.3. Apply laboratory techniques to identify microorganisms in foods.
FM.4. Explain the principles involved in food preservation via fermentation processes.
FM.5. Discuss the role and significance of adaptation and environmental factors (e.g., water activity, pH, temperature) on growth response and inactivation of microorganisms in various environments.
FM.6. Choose relevant laboratory techniques to identify microorganisms in foods.

Standard: Food safety (FS) - Hazards (physical, chemical, biological) associated with foods and the food system; their transmission and control.
Essential Learning Outcomes:
FS.1. Identify potential hazards and food safety issues in specific foods.
FS.2. Describe routes of physical, chemical, and biological contamination of foods.
FS.3. Discuss methods for controlling physical, chemical and biological hazards.
FS.4. Evaluate the conditions, including sanitation practices, under which relevant pathogenic microorganisms are commonly controlled in foods.
FS.5. Select appropriate environmental sampling techniques.
FS.6. Design a food safety plan for the manufacture of a specific food.

Learning Outcomes

Standard: Food engineering and processing (FE) - Food engineering principles; food preservation and processing; packaging materials and methods; cleaning and sanitation; water and waste management.
Essential Learning Outcomes:
FE.1. Define principles of food engineering (mass and heat transfer, fluid flow, thermodynamics).
FE.2. Formulate mass and energy balances for a given food manufacturing process.
FE.3. Explain the source and variability of raw food materials and their impact on food processing operations.
FE.4. Design processing methods that make safe, high-quality foods.
FE.5. Use unit operations to produce a given food product in a laboratory or pilot plant.
FE.6. Explain the effects of preservation and processing methods on product quality.
FE.7. List properties and uses of various packaging materials and methods
FE.8. Describe principles and practices of cleaning and sanitation in food processing facilities.
FE.9. Define principles and methods of water and waste management.

Standard: Sensory science (SS) - Analytical and affective methods of assessing sensory properties of food.
Essential Learning Outcomes:
SS.1. Discuss the physiological and psychological basis for sensory evaluation.
SS.2. Apply experimental designs and statistical methods to sensory studies.
SS.3. Select sensory methodologies to solve specific problems in food.

Standard: Quality assurance (QA) - Principles of food quality control and assurance.
Essential Learning Outcomes:
QA.1. Define food quality and food safety terms.
QA.2. Apply principles of quality assurance and control.
QA.3. Develop standards and specifications for a given food product.
QA.4. Evaluate food quality assessment systems (e.g. statistical process control).

Standard: Food Law and Regulations (FL) - Government regulations required for the manufacture and sale of food products.
Essential Learning Outcomes:
FL.1. Recall government regulatory frameworks required for the manufacture and sale of food products.
FL.2. Describe the processes involved in formulating food policy.
FL.3. Locate sources of food laws and regulations.
FL.4. Examine issues related to food laws and regulations.

Standard: Data and Statistical Analysis (DS) - Collection, analysis, interpretation, and presentation of data.
Essential Learning Outcomes:
DS.1. Use statistical principles in food science applications.

Learning Outcomes
DS.2. Employ appropriate data collection and analysis technologies. **DS.3. Construct visual representation of data.** **Standard: Critical thinking and problem solving (CT) - Scientific reasoning through uncertainty in scientific and technical situations.** **Essential Learning Outcomes:** **CT.1. Locate evidence-based scientific information resources.** **CT.2. Apply critical thinking skills to solve problems.** **CT.3. Apply principles of food science in practical, real-world situations and problems.** **CT.4. Select appropriate analytical techniques when presented with a practical problem.** **CT.5. Evaluate scientific information.** **Standard: Food Science Communication (CM) - Oral and written communication.** **Essential Learning Outcomes:** **CM.1. Write relevant technical documents.** **CM.2. Create oral presentations.** **CM.3. Assemble food science information for a variety of audiences.** **Standard: Professionalism and leadership (PL) - Organization and project management; skills necessary to work and interact with individuals from diverse backgrounds.** **Essential Learning Outcomes:** **PL.1. Demonstrate the ability to work independently and in teams.** **PL.2. Discriminate tasks to achieve a given outcome.** **PL.3. Describe social and cultural competence relative to diversity and inclusion.** **PL.4. Discuss examples of ethical issues in food science.**

Description and justification of the request

Description of specific change	Justification for this change
1) Adjust course choices to satisfy statistics requirement on each concentration: on Food Science removed STAT 2023, on FDTN removed WCOB 1033 and AGEC 2403, on FDCU added AGST 4023. (0 net change because the change is adding or removing from a list of course choices). 2) Remove requirement of MATH 2053 on FDTN for students pursuing business minors. (3 hour net change)	1) To simplify the course options list and to make uniform across the three concentrations. 2) At the time this course was added as a requirement, courses students were required to take in AGBS-m and GBUS-m required MATH 2053 as a pre-req. Since this is no longer true and the options for minors is no longer restricted, this requirement needs to be deleted.

Description of specific change	Justification for this change
3) Add CHEM 3603/3601L & CHEM 3613/3611L alternate option to CHEM 2613/2611L to FDTN and FDCU. This option is already available on FDSC. (0 net change because the change is adding to a list of course choices). 4) Add CHEM 3813 to FDTN and FDCU which is already required for FDSC. (3 hr net change). 5) Add FDSC 2523 to all concentrations (3 hour net change). 6) Add FDSC 4122/4121L to FDTN and FDCU (3 hour net change). 7) Removed NUTR 1213 from FDTN and FDCU (3 hour net change). 8) Removed upper division requirement for communication intensive courses for FDCU.	3) To provide uniform course options across the three concentrations. Also provides additional upper division course options to FDTN and FDCU. 4) Provides additional required upper division coursework for FDTN and FDCU. This course is needed for any student considering post graduate education in Food Science. While those on FDTN and FDCU who indicate an interest in graduate school are heavily advised to take the course as an elective, frequently students decide at the last minute to go to graduate school and therefore have not taken or can not work in taking biochemistry. 5) This course replaces FDSC 2503 on FDTN and FDCU (FDSC 2503 is no longer taught) and is an additional course for FDSC. This course provides competencies in the area of food safety not covered in other FDSC classes that are critical to careers in the food industry for all graduates. 6) Course was an option course for FDTN and will now be required. Addition of course to FDCU provides additional upper division course. This course provides competencies in the area of food safety/food microbiology not covered in other FDSC classes that are critical to careers in the food industry for all graduates. 7) Desired competencies from NUTR 1213 are also obtained from other required courses therefore chosen as a course to remove to accommodate addition of other upper division courses. 8) Increase of required upper division and more

Description of specific change	Justification for this change
	options for adding upper division allows more flexibility for choice on this requirement. All concentrations can meet 40 hours of upper division through required coursework and choices through communication intensive, statistics, chemistry, philosophy and elective hours.

Upload attachments

- 20-21-fdscbs-fdcu.pdf
- 20-21-fdscbs-fdtn-9sdcp.pdf
- 20-21-fdscbs-fdtn.pdf
- 20-21-fdscbs-fdsc-9sdcp.pdf
- 20-21-fdscbs-fdsc.pdf
- 20-21-fdscbs-fdcu-9sdcp.pdf
- FDSC 40 hours Upper Division Justification.pdf

Reviewer Comments

Alice Griffin (agriffin) (11/05/19 11:16 am): Changed scheduled program review date from 2019-2020 (which is the date for the FDSC concentration) to 2022-2023 which includes the FDSC major and other concentrations.

Michael Thomsen (mthomsen) (11/15/19 5:57 pm): Rollback: Per Dean's office request pending second reading

Key: 132