

Food Protein Syllabus Fall 2019

FDSCTE 7640. Food Proteins: Chemistry, Technology and Applications (2.0 Units)

Instructor

Dr. Rafael Jiménez-Flores

jjimenez-flores.1@osu.edu

Tel: 2-1993

329 Parker Food Science Building

Office Hours: M-W 2:00-3:00

Course meets Tuesdays – Thursdays 11:30-1:20 for 7 Weeks

Parker Building Room 114

Format: Lecture with laboratory demonstrations

Prerequisites: FDSCTE 2400 (or equivalent), FDSCTE 5600 (or equivalent), or instructor permission.

Expected Learning Outcomes

The course is designed to learn first, about the origin of the various proteins, their functional and nutritional properties and the relative importance of the proteins in the various food applications.

The functionalities of each individual protein will be highlighted, as well as the processing methods to extract proteins, the various types of proteins available, the processing and applications context and the major reasons for use in the processing food industry. In this first section the full focus of each individual protein presentation is on:

Learning Objectives:

- Appreciation for size and scope of food proteins processing industry
- Basic understanding of the role of proteins in nutrition, health and wellness
- Knowledge base on composition, quality and properties of food proteins
- Familiarity with specific food proteins used in the industry
- Familiarity with basic chemical and physical properties of food proteins
- Understanding on how to evaluate the impact of manufacturing processes, including storage and distribution, on the quality of food proteins
- To describe the processes required for extracting and using proteins in foods
- Familiarity with contemporary issues in food proteins

Specific objectives

- Properties of the various plant and animal raw materials and protein basis
- Processing methods to extract proteins
- Various types of proteins with their functionalities

- Further processing methods such as extrusion for texturizing proteins
- Major food applications for the various types of proteins: reasons for usage
- Food proteins covered in this course (plant- and animal-based):

Course Materials

Lectures will be posted in PPT on Canvas

Text: Handbook of Food Proteins , Phillips and Williams Eds (2011)

Food Proteins and Their Applications, Srinivasan et al. (1997)

Schedule (Tentative)

First Section Week 1

Nutritional & Health Benefits of Food Proteins

Current views of protein balance in nutrition

Establishing levels of protein quality and intake that can support optimal health and wellness

Promotion of growth and prevention of muscle wasting

Bioavailability of proteins and its relationship with food processing

Second Section Week 2-3

Review of Basic Protein Chemistry

Amino acids, properties and classification

Protein structure

Stability of proteins and thermodynamics

Functional properties of proteins

Protein Modification for the food industry – Physical, Chemical and Enzymatic

Third Section Week 4

Protein Functionality, Denaturation, Aggregation and Agglomeration

Description of how proteins perform during processing and in formulations

Effects of the processing environment: pH, salt, sugar and heat

Chemical and Physical changes of proteins under processing conditions:

Fourth Section Week 4-7

Discussion of peer reviewed papers with examples on most used proteins: Written report and presentation

-Casein and milk protein concentrates

-Whey proteins

-Collagen and Gelatin

-Soy protein

-Pea protein

-Lentil protein

-Canola protein

-Pulse flours which are made from fava bean, chickpea, yellow lentil or yellow pea

Lectures and Demonstrations in the laboratory will be the basis for grading

Grading

Quizzes (3)

25%

First quiz will cover students understanding of nutritional and basic chemical aspects of proteins in foods

Second quiz will probe in depth the knowledge of chemical and physical properties of proteins and also the basics of protein stability

Third quiz will focus on the student's recognition of changes of proteins during processing.

Independent reports/Assignments (3)

35

Each report will be based on the student comprehension and critical review of current literature on different proteins used in studies on food applications.

The reports will be presented to the group, and students will be evaluated on their ability to respond to questions from the other students and from the instructor.

Examinations (mid-term)

15

A comprehensive probe on the student's ability to recognize the chemical and functional properties of proteins and to be able to relate to the chemical principles ruling them.

Final examination

25

Comprehensive exam on learning objectives outlined above.

Scale for final grade

93-100%	A
90-93	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
65-69	D+
60-64	D
< 60	E

Academic Misconduct:

"It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>."

Disability Services:

“Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901;<http://www.ods.ohio-state.edu/>.”