



UNIVERSITÀ  
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del Sacro Cuore

# Food Technology: Behind and beyond plant-based proteins

PROFESSORS: GIORGIA SPIGNO, (OTHER COLLEAGUES TO BE DEFINED)

## Overview

**Area:** Agribusiness and Food Sciences

**Dates:** June 27 – July 8

**Campus:** Piacenza

**Course Number:** AG/FD320

**Term:** Summer 2022

**Credits:** 6 ECTS

## Course description

The course aims to provide students with tools to develop sustainable food industrial processes. After an introduction to the main unit operations in the food industry, the production of protein concentrate and isolates from different plant sources will be addressed as a reference case study for the sustainable design of a food process. The most currently used extraction and stabilization processes for protein production from soy and pea will be illustrated, together with the available potentially more sustainable technological improvements. The main unit operations (milling, extraction, centrifugation, enzymatic hydrolysis, thermal treatment and drying) will be described for the operation principles, the effect on the quality of the processed materials, and for the mass and energy balances in order to learn the main elements for the sizing and production costs of a process. Introduction to the by-products generated in the process and their potential destination will also be given.

Upon successful completion of the course, students will

- be familiar, both from a theoretical and empirical perspective, with the main unit operations required in a plant protein production process as case-study;
- be able to perform a mass balance on a plant protein extraction process together with some insight into water, chemical and energy requirements;
- be able to identify the main by-products generated in plant protein extraction processes and the possible associated valorization strategies;
- be able to identify food safety issues associated with plant proteins production and associated required stabilization processes.

## Course contents

The course is divided into four main modules:

1. Introduction to unit operations and basic mass and energy balances for design and management of food processes.
2. Development of a process for the production of plant-based proteins.
3. By-products valorisation.
4. Laboratory activities on plant protein extraction and mass balance definition and introduction to production costs estimation.

## Prerequisites

The course is open to students with a food science, technology and engineering and chemical engineering background. A good working knowledge of English is essential.



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## Method of teaching

- Lectures
- Class discussions
- Group project works
- Guest speakers

## Course requirements

- Students are expected to regularly attend sessions and to actively take part in class debates and case discussions
- Students are expected to be prepared on the assigned readings before the lectures
- Students are expected to deliver individual and group assignments and present it to the class.

## Credits

6 ECTS

## Grading (TBC)

Project work    30 %  
Final exam     70 %

The in-class assessment will be composed of project work and a final a written exam with multiple-choice questions. The weights on the two parts are 30% project work and 70% final exam.

## Rules of conduct

**Attendance:** Attendance is mandatory and no absence/s will be excused. Please consider that Field Trips are consider equal to regular classes and indeed you are expected to attend the visits. Unexcused absences will not be accepted. An excused absence will only be granted if you are seriously ill and can support your claim with a local doctor's certificate dated the day you missed class (therefore you must go to the doctor that same day) that has to be delivered to the Professor or to Cattolica International Office. Any other absence will not be excused and will result in not being admitted to the final exam, which corresponds to a 0 (zero) in the final exam.

**Exam Date:** The exam date cannot be re-scheduled. Should the dates of the final exams be moved for force major reasons, Cattolica International Office and the Professor will promptly inform you in class and/or via email on the new date agreed. Unexcused absences to the exams will result in a failing grade in the course. In cases of unforeseeable circumstances such as illness or injury on the day of the exams, you must submit a medical certificate and communicate your absence to the Professor and Cattolica International Office via email prior to the exam. If the student does not justify his/her absence through sufficient documentation and with adequate notice before the final test, you will receive an automatic Failed. Absences for other unforeseeable circumstances will not be accepted and will result in a failing grade.



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## Bio of the instructor

**Giorgia Spigno** is Full Professor in food science and technology at the DiSTAS – Department for Sustainable Food Process of the Faculty of Agriculture, Food and Environmental Sciences of the Università Cattolica del Sacro Cuore. She holds a MSc degree in Food Science and Technology (1999, Università Cattolica) and a PhD in Chemical and Process Engineering (2003, Università degli Studi di Genova, Italy). Since 2001 she has been teaching different course in Food Processing, Food Processing Plants, Food Packaging and Risk mitigation in food processing at both BSc and MSc degree in Food Science and Technology and Food Technology and Sustainability at the Agrisystem PhD School (Università Cattolica).

She has gained expertise in food processing, food packaging and plant design, optimisation, innovation and modelling, such as on characterisation and optimisation of food functional profiles and shelf-life. Her main past and current research areas are:

- innovative and sustainable food packaging systems;
- valorisation of agro-food by-products through the recovery of high added-value compounds, in particular antioxidant compounds and fibres;
- development employment of natural bioactives and fibres for the production of food ingredients;
- economical, safety and global aspects in the planning and management of food plants.