SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Drying

Educational subject description sheet

Basic information

Field of study Food Science - Technology and Nutrition	**Didactic cycle** 2023/24
Speciality -	**Subject code** NoZTNS_D.120K.04046.23
Organizational unit Faculty of Food Technology	**Lecture languages** english
Study level first cycle (bachelor's degree)	**Mandatory** Elective subjects
Study form full-time studies	**Block** Major subjects
Education profile General academic	**Disciplines** Food technology and nutrition

Coordinator	Katarzyna Samborska
Teacher	Katarzyna Samborska

Period Semester 6	**Examination** Pass with grade **Activities and hours** Lecture: 30 Laboratory exercises: 15	**Number of ECTS points** 3

Goals

Code	Goal
C1	The aim of the course is to familiarize students with information on: the role of drying in the food industry, forms and properties of water in food, properties of dried food products, the influence of phase changes on the properties of dried food, kinetics and methods of drying, methods of pre-treatment before drying, microencapsulation by drying

Entry requirements

Food raw materials, Introduction into food processing, Food production equipment, Basics of food engineering

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the role of drying in the food industry, water properties in food, the influence of phase changes on food properties, the kinetics of food drying, factors influencing the drying process, methods of food drying, methods of pre-treatment before drying, microencapsulation by drying	TN_K1_W01, TN_K1_W04, TN_K1_W05, TN_K1_W06, TN_K1_W11	Test (written or computer based)
Skills – Student can:			
U1	conduct an experiment of drying selected raw materials with selected methods, assess the influence of various parameters/factors on the course of the process and properties of the obtained products	TN_K1_U01, TN_K1_U03, TN_K1_U07, TN_K1_U09	Report, Presentation

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	During the lectures, students will be introduced to: - general characteristics of the drying process, including its energy consumption, - the properties of water in food, - influence of phase changes on the properties of dried food, - kinetics of food drying, factors influencing the drying process, - food drying methods, - methods of pre-treatment before drying, including PEF, US treatment, - microencapsulation of food ingredients by drying.	W1	Lecture
2.	During the laboratory classes, students will be acquainted with selected methods of preliminary operations before drying and with selected drying methods.	U1	Laboratory exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture, E-learning - lecture part
Laboratory exercises	E-learning - exercises part, Laboratory (experiment), learning by experiment

Activities	Examination method	Percentage
Lecture	Test (written or computer based)	50%
Laboratory exercises	Report	25%

Activities	Examination method	Percentage
Laboratory exercises	Presentation	25%

Activities	Credit conditions
Lecture	Test - 50% points
Laboratory exercises	Laboratories (report + presentation) - 50% points

Literature

Obligatory

1. Jangam, S.V., Law, C.L. Mujumdar A.S. 2010. Drying of Foods, Vegetables and Fruits - Volume 1-3
2. Sablani, S.S., and M.S.Rahman. 2007. Fundamentals of food dehydration. In Food drying science and technology: Microbiology, chemistry, applications, ed. Y.H.Hui, C.Clary, M.M.Farid, O.O.Fasina, A.Noomhorm, and J.Welti-Chenis, 1–42. Lancaster, PA: DESTech Publications
3. Patel, R. P., Patel, M. P., & Suthar, A. M. (2009). Spray drying technology: an overview. Indian Journal of Science and Technology, 2(10), 44-47.

Optional

1. Sobulska, M., & Zbicinski, I. (2020). Advances in spray drying of sugar-rich products. Drying Technology, 1-26.
2. Llavata, B., García-Pérez, J. V., Simal, S.,(2020). Innovative pre-treatments to enhance food drying: a current review. Current Opinion in Food Science, 35, 20-26.2.
3. Samborska, K., Poozesh, S., Barańska, A., Sobulska, M., Jedlińska, A., Arpagaus, C., ... & Jafari, S. M. (2022). Innovations in spray drying process for food and pharma industries. Journal of Food Engineering, 110960.
4. Jafari, S. M., Arpagaus, C., Cerqueira, M. A., & Samborska, K. (2021). Nano spray drying of food ingredients; materials, processing and applications. Trends in Food Science & Technology, 109, 632-646.
5. Other suggested by teacher

Calculation of ECTS points

Activity form	Activity hours*
Lecture	30
Laboratory exercises	15
Preparing a report	10
Preparation for the test	10
Preparation of a multimedia presentation	10
Student workload	**Hours** 75
Number of ECTS points	**ECTS** 3

* hour means 45 minutes

Effects

Code	Content
TN_K1_U01	The graduate can conduct experiments and solve practical issues in the field of basic sciences, and then implement them in activities carried out under directional issues in the field of food processing and human nutrition
TN_K1_U03	The graduate can select methods and tools to make observations, measurements, and calculations in the field of phenomena occurring during processing, storage, research of food, human nutrition and consumer behaviour on the food market, and critically analyze and interpret the obtained data, assess the credibility of own actions
TN_K1_U07	The graduate can communicate with the surrounding using specialist terminology appropriate for the field of study, including taking part in a discussion on professional issues, also using a foreign language in the field relevant to the field of study, in accordance with the requirements set out for B2 level of the European System for the Description of Education Linguistic
TN_K1_U09	The graduate can update knowledge and deepen practical skills in the field of study, taking into account the progress in the development of science and technology, and the need for specific competences in the food production and human nutrition sector
TN_K1_W01	The graduate knows and understands theoretical issues in the field of biological, chemical, mathematical, and related sciences, which are the basis for the description of phenomena occurring in food and the human being body, used for its description
TN_K1_W04	The graduate knows and understands the theoretical basis of phenomenon and changes occurring in raw materials, semi-finished products, and food products in a natural way, and under the influence of technological processes, food storage and testing
TN_K1_W05	The graduate knows and understands basics of construction and operation of machines, devices, and instruments used for food processing and testing
TN_K1_W06	The graduate knows and understands methods and techniques used for food processing, preservation, storage, and testing
TN_K1_W11	The graduate knows and understands economic, social, environmental, ethical, and legal conditions of food production and the principles of development of new products, distribution, and offering food to consumers, including basic concepts and principles in the field of protection of industrial property and copyright