UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Program studiów

Kierunek: Food Technology

Spis treści

Charakterystyka kierunku

Informacje podstawowe

Nazwa kierunku:	Food Technology
Poziom:	studia drugiego stopnia (magister inżynier)
Profil:	ogólnoakademicki
Forma:	stacjonarne
Tytuł zawodowy nadawany absolwentom:	magister inżynier
Czas trwania studiów (liczba semestrów):	3
Liczba punktów ECTS konieczna do ukończenia studiów na danym poziomie:	102
Liczba godzin (w tym realizowanych z wykorzystaniem metod i technik kształcenia na odległość):	1362
Liczba godzin z wychowania fizycznego*:	0

*) - dotyczy studiów pierwszego stopnia i jednolitych studiów magisterskich realizowanych w formie stacjonarnej

Przyporządkowanie kierunku do dziedzin oraz dyscyplin, do których odnoszą się efekty uczenia się:

Dyscyplina wiodąca	Udział procentowy	ECTS
Technologia żywności i żywienia	100%	102

Sylwetka absolwenta

Studia II stopnia kierunku Food technology są studiami wspólnymi realizowanymi we współpracy z Miguel Hernández University z Elche (Hiszpania)

Absolwent studiów II stopnia kierunku Food technology ma pogłębioną wiedzę i umiejętności z zakresu: innowacyjnych metod produkcji żywności, a także analizy surowców i produktów żywnościowych, systemów zarządzania jakością i bezpieczeństwem żywności, procesów biotechnologicznych w produkcji żywności, wytwarzania żywności o cechach funkcjonalnych, innowacyjnych technik pakowania żywności. Jest przygotowany do projektowania i prowadzeni eksperymentów badawczych z wykorzystaniem nowoczesnych metod analitycznych, technik, technologii, i narzędzi matematycznych. Potrafi zinterpretować oraz opracować uzyskane wyniki doświadczalne.

Absolwent kierunku Human nutrition jest przygotowany do podjęcia pracy na różnych stanowiskach, w tym kierowniczych w: zakładach przemysłu spożywczego i fermentacyjnego, zakładach żywienia zbiorowego i gastronomii, stacjach sanitarno-epidemiologicznych, laboratoriach i placówkach badawczych. Może również podjąć naukę w szkole doktorskiej lub na studiach podyplomowych.

Wymiar (liczba godz. i punktów ECTS), zasady i forma odbywania praktyk

Program studiów nie obejmuje praktyk zawodowych.

Zasady/organizacja procesu dyplomowania

Pracę magisterską student wykonuje pod opieką dwóch opiekunów naukowych posiadających stopień co najmniej doktora – nauczycieli akademickich z Uniwersytetu Przyrodniczego we Wrocławiu (UPWr) oraz Miguel Hernández University z Elche (MHU).

Temat pracy magisterskiej powinien być ustalony najpóźniej rok przed końcem studiów. Po zaliczeniu wszystkich przedmiotów realizowanych w ostatnim semestrze studiów, w wyłączeniem przedmiotu Final master project, student wprowadza pracę magisterską do systemu APD. Promotor z UPWr sprawdza plik wprowadzonej do systemu pracy i zatwierdza ją lub odrzuca. Jeżeli praca została odrzucona student po uzgodnieniu z promotorem poprawia pracę i wprowadza ponownie do systemu APD.

Zatwierdzona praca magisterska kierowana jest do oceny oryginalności w Jednolitym Systemie Antyplagiatowym, którego

wynikiem są Raporty z badania antyplagiatowego. Na podstawie w.w raportów promotor ocenia czy praca nie zawiera nieuprawnionych zapożyczeń lub czy zawarte w niej prawidłowo oznaczone zapożyczenia (cytaty) nie budzą wątpliwości co do samodzielności pracy dyplomowej przygotowanej przez studenta.
Jeżeli raporty nie budzą zastrzeżeń, opiekun pracy magisterskiej zatwierdza je i przekazuje pracę do recenzji. Jeżeli w pracy zostały przekroczone dopuszczalne współczynniki podobieństwa zostaje wszczynana procedura antyplagiatowa zgodna z obowiązującym Zarządzeniem Rektora.
Oceny pracy magisterskiej dokonuje każdy z opiekuów pracy i jeden recenzent z UPWr lub MHU. Spośród osób oceniających pracę co najmniej jedna musi posiadać tytuł profesora lub stopień naukowy doktora habilitowanego.
Termin egzaminu wyznacza dziekan.
Egzamin magisterski odbywa się przed komisją egzaminacyjną powołaną przez dziekana. W skład komisji wchodzą przewodniczący (dziekan lub prodziekan), opiekunowie i recenzent pracy magisterskiej. Dziekan może rozszerzyć skład komisji o specjalistów z przedmiotów kierunkowych oraz przedstawiciela otoczenia gospodarczego zainteresowanego tematem pracy. Egzamin magisterski jest egzaminem ustnym, który może być przeprowadzony w trybie zdalnym. Student prezentuje przed komisją ogólne założenia i wnioski swojej pracy oraz odpowiada na trzy wylosowane pytania z zakresu przedmiotów realizowanych podczas studiów, spośród zestawu zatwierdzanego przez komisję programową kierunku studiów.
Ostateczny wynik studiów jest obliczany zgodnie z zasadami określonymi w obowiązującym Regulaminie studiów.

ECTS

Liczba punktów ECTS, którą student uzyska na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich lub innych osób prowadzących zajęcia i studentów	54
Liczba punktów ECTS, którą student uzyska w ramach zajęć z dziedziny nauk humanistycznych lub nauk społecznych **	10
Liczba punktów ECTS, którą student uzyska za zajęcia wybieralne	39
Liczba punktów ECTS przyporządkowana zajęciom związanym z prowadzoną w uczelni działalnością naukową w dyscyplinie lub dyscyplinach, do których przyporządkowany jest kierunek studiów	77
Liczba punktów ECTS przyporządkowana zajęciom kształtującym umiejętności praktyczne	

**) - dotyczy kierunków innych niż przypisane do dyscyplin nauk humanistycznych lub nauk społecznych

Dopuszczalny deficyt punktów ECTS po poszczególnych semestrach

Semestr	Deficyt	Komentarz
1	0	
2	0	
3	0	

Sekwencje przedmiotów

Semestr	Nazwa przedmiotu realizowanego	Nazwa przedmiotu poprzedzającego

Efekty uczenia się

Wiedza

Kod	Treść
NT_P7S_WG01	Absolwent zna i rozumie w stopniu pogłębionym zagadnienia z zakresu produkcji i technologii żywności, umożliwiające zapewnienie doradztwa naukowego i technicznego producentom i konsumentom.
NT_P7S_WG02	Absolwent zna i rozumie w stopniu pogłębionym osiągnięcia w biotechnologii rolno-spożywczej i wskazuje ich praktyczne zastosowania.
NT_P7S_WG03	Absolwent zna i rozumie główne wskaźniki pogorszenia jakości żywności i wykorzystuje je w celu dostosowania technologii pakowania i utrwalania do strategii marketingowych produktów rolno-spożywczych.
NT_P7S_WG04	Absolwent zna i rozumie rozumie w stopniu pogłębionym postęp naukowy w produkcji i przygotowaniu żywności, pozwalający na poprawę jej jakości i funkcjonalności.
NT_P7S_WG05	Absolwent rozumie i wdraża postęp naukowy w produkcji żywności oraz wykorzystuje go w projektach badawczo-rozwojowych z zakresu przemysłu spożywczego.
NT_P7S_WK06	Absolwent zna i rozumie narzędzia do wyszukiwania informacji naukowej i prawnej w technologii rolno-spożywczej.
NT_P7S_WK07	Absolwent rozumie informacje na temat ogłaszanych konkursów badawczo-rozwojowych, prawodawstwa w zakresie własności intelektualnej i przemysłowej oraz praw związanych z technologiami rolno-spożywczymi.

Umiejętności

Kod	Treść
NT_P7S_UK07	Absolwent potrafi porozumiewać się ze specjalistami z branży związanej z produkcją żywności oraz posługiwać się w stopniu zaawansowanym specjalistyczną terminologią w języku obcym na poziomie B2 + Europejskiego Systemu Opisu Kształcenia
NT_P7S_UK08	Absolwent potrafi zaplanować proces ciągłego doskonalenia i uczenia się przez całe życie w dziedzinie rolno-spożywczej.
NT_P7S_UO06	Absolwent potrafi zaplanować i opracować projekty badawcze związane z jakością i bezpieczeństwem żywności w technologii rolno-spożywczej.
NT_P7S_UW01	Absolwent potrafi korzystać z narzędzi do wyszukiwania istotnych i wiarygodnych informacji w celu rozwiązywania problemów, opracowywania strategii i doradztwa dla przemysłu rolno-spożywczego.
NT_P7S_UW02	Absolwent potrafi tworzyć raporty i opracowywać procedury zarządzania jakością i bezpieczeństwem żywności.
NT_P7S_UW03	Absolwent potrafi opracować innowacyjne strategie w zakresie kontroli surowców, wpływające na poprawę jakości wyrobów gotowych.
NT_P7S_UW04	Absolwent potrafi opracować i wykorzystać procedury dodawania do żywności składników o właściwościach funkcjonalnych i odżywczych oraz oceniać ich potencjał rynkowy pod kątem akceptacji konsumentów
NT_P7S_UW05	Absolwent potrafi rozwijać i wykorzystywać narzędzia do oceny produktów ubocznych w przemyśle rolno-spożywczym.

Kompetencje społeczne

Kod	Treść
NT_P7S_KK01	Absolwent jest gotów do krytycznej i samokrytycznej oceny oraz analizy postępu naukowego w zakresie technologii i jakości produktów rolno-spożywczych.
NT_P7S_KO02	Absolwent jest gotów do wykorzystywania zdobytej wiedzy i formułowania opinii, obejmujących refleksję nad społeczną i etyczną odpowiedzialnością w dziedzinie przemysłu rolno-spożywczego.
NT_P7S_KOR3	Absolwent jest gotów do wykorzystywania potencjału innowacyjności i kreatywności w dziedzinie rolno-spożywczej dla podnoszenia jakości życia społeczeństwa.

Plany studiów

Semestr 1

Przedmiot	Liczba godzin	Punkty ECTS	Forma weryfikacji	
Biotechnology of plant products	Wykład: 20 Ćwiczenia laboratoryjne: 10	4.0	Zaliczenie na ocenę	O
Diploma laboratory	Ćwiczenia laboratoryjne: 120	5.0	Zaliczenie na ocenę	O
Diploma seminary	Ćwiczenia laboratoryjne: 30	2.0	Zaliczenie na ocenę	O
Forms of intellectual and industrial property	Wykład: 15	1.0	Zaliczenie na ocenę	O

Semestr 2

Przedmiot	Liczba godzin	Punkty ECTS	Forma weryfikacji	
Biotechnological advances in food production	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Egzamin	O
Biotechnology of animal production	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	O
Biotic and abiotic contamination of food	Wykład: 30 Ćwiczenia laboratoryjne: 15	4.5	Egzamin	O
Innovation in meat, dairy and fish production	Wykład: 30 Ćwiczenia laboratoryjne: 15	4.5	Egzamin	O
Managment and funding of public and private research	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	O
Pre/post harvest eco-innovative treatments	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	O
Aromatic compounds in food				O/F
The student chooses one subject				
Aromatic profile in food and its relationship with quality	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Egzamin	F
Chromatographic analysis of volatiles in food, agricultural and pharmacy	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Egzamin	F
Bioactive food ingredients				O/F

Przedmiot	Liczba godzin	Punkty ECTS	Forma weryfikacji	
The student chooses one subject				
Bioactive compounds with antioxidant proporties	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	F
Nutraceuticals and functional food ingredients	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	F
Innovative food packaging				O/F
The student chooses one subject				
Eddible coatings	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	F
Innovative packaging	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	F
Enriched food				O/F
The student chooses one subject				
Production of food enriched in dietary fiber	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	F
Quality and nutritional value of food products enriched with dietary fiber	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	F
Final project				O/F
The student chooses one subject				
Final project - Food quality and functionality research	Wykład: 30 Ćwiczenia projektowe/warsztatowe: 120	12.0	Zaliczenie na ocenę	F
Final project - Innovation and development of food quality and safety	Wykład: 30 Ćwiczenia projektowe/warsztatowe: 120	12.0	Zaliczenie na ocenę	F

Semestr 3

Przedmiot	Liczba godzin	Punkty ECTS	Forma weryfikacji	
Advanced in animal well-being and food safety in raw materials	Wykład: 30 Ćwiczenia laboratoryjne: 15	4.5	Egzamin	O
Advanced methodologies in food quality and safety	Wykład: 30 Ćwiczenia laboratoryjne: 15	4.5	Zaliczenie na ocenę	O

Przedmiot	Liczba godzin	Punkty ECTS	Forma weryfikacji	
Biosustainability and assesment of food industry co-products	Wykład: 10 Ćwiczenia projektowe/warsztatowe: 20	3.0	Zaliczenie na ocenę	O
Development and new packing technologies	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	O
Innovation in processed and minimaly proceessed plant-based foods	Wykład: 30 Ćwiczenia laboratoryjne: 15	4.5	Zaliczenie na ocenę	O
Market opportunity analysis and direction of agro-food marketing	Wykład: 15 Ćwiczenia projektowe/warsztatowe: 15	3.0	Zaliczenie na ocenę	O
Planning and preparation of scientific papers	Wykład: 20 Ćwiczenia laboratoryjne: 10	3.0	Zaliczenie na ocenę	O
Sensory analysis as a tool for food innovation	Wykład: 30 Ćwiczenia laboratoryjne: 15	4.5	Egzamin	O
Final master project				O/F
The student chooses one course				
Final master project - Food quality and functionality research	Wykład: 30 Ćwiczenia laboratoryjne: 120	12.0	Egzamin	F
Final master project - Innovation and development of food quality and safety	Wykład: 30 Ćwiczenia laboratoryjne: 120	12.0	Egzamin	F
The quality of animal origin food				O/F
The student chooses one subject				
Challenges and innovations in foods of animal-origin	Wykład: 20 Ćwiczenia projektowe/warsztatowe: 10	3.0	Zaliczenie na ocenę	F
Research oriented at improving animal product quality and safety	Wykład: 20 Ćwiczenia projektowe/warsztatowe: 10	3.0	Zaliczenie na ocenę	F

O - mandatory
F - optional
O/F - Compulsory group of optional subjects
B - major subjects
A - general subjects
C - specialization subjects
HS - humanities and social sciences
JO - foreign languages
AO - general subjects (conducted) in foreign languages
BO - major subjects (conducted) in foreign languages
CO - specialization subjects (conducted) in foreign languages
JO-A1 - Języki obce (A1)
JO-A1/A2 - Języki obce (A1/A2)
JO-A2/B1/B2 - Języki obce (A2/B1/B2)
JO-A2/B1 - Języki obce (A2/B1)

JO-B1 - Języki obce (B1)
JO-B2/C1 - Języki obce (B2/C1)
JO-B2 - Języki obce (B2)
JO-B1/B2/C1 - Języki obce (B1/B2/C1)
JO-B1/B2 - Języki obce (B1/B2)
JO-A1/A2/B1 - Języki obce (A1/A2/B1)
HSO - humanities and social sciences (conducted) in foreign languages

Sylabusy

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Biotechnology of plant products

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI1BO.3225.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Joanna Kolniak-Ostek
Other teachers conducting classes	Joanna Kolniak-Ostek, Ludwika Tomaszewska-Hetman, Witold Pietrzak, Mateusz Gertchen

Period	**Examination**	**Number of ECTS points**
Semester 1	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	4.0

Goals

C1	The aim of the course is to introduce students to issues related to the biotechnological processes in the production of food of plant origin
C2	Learning about technical and technological solutions used in distilling, brewing, winemaking, lactic acid fermenting and baking
C3	Getting to know the fermentation processes of raw materials of plant origin
C4	Getting to know the enzymatic processes used in the biotechnological processing of food ingredients of plant origin

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	The student knows and understands the biotechnological processes used in the processing of food of plant origin	NT_P7S_WG04	written credit, test
W2	The student knows and understands the most important processes, procedures, materials and equipment used on a laboratory and industrial scale in biochemical processes	NT_P7S_WG04	observation of student’s work, active participation, report, performing tasks
Skills – Student can:			
U1	The student is able to use advanced research techniques and uses laboratory equipment and devices	NT_P7S_UW03	observation of student’s work, active participation, performing tasks
U2	The student is able to analyze, synthesize and present information on fermentation processes obtained during research and from literature databases, including intellectual protection procedures.	NT_P7S_UW01	written credit, report, test
U3	The student is able to use professional terminology in a foreign language	NT_P7S_UK07	observation of student’s work, active participation
Social competences – Student is ready to:			
K1	The student is ready to propose a practical solution based on the results of his own research or literature data	NT_P7S_KOR3	observation of student’s work, active participation, report
K2	The student is ready to interpret and combine the obtained information into a coherent whole	NT_P7S_KK01	written credit, observation of student’s work, active participation, test, performing tasks

Balance of ECTS points

Activity form	Activity hours*
lecture	20

laboratory classes	10
presentation/report preparation	9
exam participation	1
consultations	15
report preparation	10
class preparation	15
exam / credit preparation	10
conducting research	20
literature study	10

Student workload	**Hours** 120	**ECTS** 4.0
Workload involving teacher	**Hours** 46	**ECTS** 1.8
Practical workload	**Hours** 40	**ECTS** 1.5

* hour means 45 minutes

Study content

No.	Course content	Activities

1.	1. Health value of fermented food of plant origin. Technology of fermented plant raw materials and fermented beverages; Fermented oriental foods (kimchi, miso, tempeh, tofu). 2. Raw materials, bioreactants (wine yeast) and auxiliary materials used in winemaking; Technology of production of white and red wines (stages, technical and technological solutions). 3. Biochemical basis of the alcoholic fermentation process; substrates and products of ethanol fermentation. 4. Distilling - raw materials, auxiliary materials, methods and stages of production; 5. Beer Brewing - microorganisms, raw materials, methods and stages of malt and beer production, technical solutions, basic beer classification; 6. Fermentation processes in baking technology: Characteristics of bakery raw materials in terms of fermentation properties; Diagram of bread production technology; The process of fermentation of wheat dough on yeast; The fermentation process of rye and mixed dough 7. Characteristics of the microflora of baker's leaven; Bakery starter cultures 8. Biotechnological production of biomass. Biopolymers of microbial origin. 9. Biosynthesis of dyes and vitamins. 10. Biosynthesis of organic acids: acetic, citric and lactic acid.	lecture
2.	1. Beer Brewing 2. Lactic acid fermentation	laboratory classes

Course advanced

Teaching methods:

Mixed learning, classes, lecture, participation in research, discussion, computer lab/laboratory, teamwork, presentation / demonstration

Activities	Examination methods	Percentage in subject assessment
lecture	test	50%
laboratory classes	written credit, observation of student’s work, active participation, report, performing tasks	50%

Literature

Obligatory

1. Faber, K. Biotransformations in organic chemistry, 5th Ed., Springer-Verlag, Berlin Heidelberg New York 2004.
2. Panesar, P.P., Marwaha, S.S., Chopra, H.K. Enzymes in Food Processing: Fundamentals and Potential Applications, I K International Publishing House Pvt. Ltd, 2010
3. Soccol, C.R., Pandey, A., Larroche, C. Fermentation Processes Engineering in the Food Industry, CRC Press, 2016

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Diploma laboratory

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI1BO.3649.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** mandatory
Study form Full-time	**Block** major subjects (conducted) in foreign languages
Education profile General academic	**Subject related to scientific research** Yes
	Subject shaping practical skills Yes

Teacher responsible for the subject	Anna Dąbrowska, Małgorzata Korzeniowska
Other teachers conducting classes	Anna Dąbrowska, Małgorzata Korzeniowska

Period	**Examination**	**Number of ECTS points**
Semester 1	graded credit **Activities and hours** laboratory classes: 120	5.0

Goals

C1	The aim of the course is the evaluation of the progress in research made by the student and support in the preparation of the master thesis

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the topics of modern techniques in food processing and analysis, human nutrition and systems of food quality management	NT_P7S_WG03, NT_P7S_WG04, NT_P7S_WK06	observation of student's work
W2	the rules of experoimant planning and their verification methods	NT_P7S_WG02, NT_P7S_WG04	observation of student's work
Skills – Student can:			
U1	plan and conduct research for master thesis preparation	NT_P7S_UO06, NT_P7S_UW01	observation of student's work
U2	use modern analytical methods for the thesis preparation	NT_P7S_UW01	observation of student's work
U3	perform the statistical analysis of obtained results	NT_P7S_UW01	observation of student's work
U4	Student is able to use specialist nomenclature in a foreign language	NT_P7S_UK07	observation of student's work
Social competences – Student is ready to:			
K1	critical analysis of of obtained results in context of the scientific literature	NT_P7S_KK01	observation of student's work
K2	present a repsonsible social and ethical attitude to the conducted reseach	NT_P7S_KO02	observation of student's work

Balance of ECTS points

Activity form	Activity hours*
laboratory classes	120
presentation/report preparation	5
consultations on diploma paper	5
conducting research	20

Student workload	**Hours** 150	**ECTS** 5.0
Workload involving teacher	**Hours** 125	**ECTS** 5.0
Practical workload	**Hours** 140	**ECTS** 5.0

* hour means 45 minutes

Study content

No.	Course content	Activities

1.	Plan of indywidual project. Research methodology. Evaluation and presentation of research date.	laboratory classes

Course advanced

Teaching methods:

discussion, project-based learning (PBL)

Activities	Examination methods	Percentage in subject assessment
laboratory classes	observation of student’s work	100%

Entry requirements

finished first cycle of study

Literature

Obligatory

1. Scientific literature (books, articles) in the toipic of the research

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Diploma seminary

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI1BO.3648.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** mandatory
Study form Full-time	**Block** major subjects (conducted) in foreign languages
Education profile General academic	**Subject related to scientific research** Yes
	Subject shaping practical skills No

Teacher responsible for the subject	Anna Dąbrowska, Małgorzata Korzeniowska
Other teachers conducting classes	Anna Dąbrowska, Małgorzata Korzeniowska

Period	**Examination**	**Number of ECTS points**
Semester 1	graded credit **Activities and hours** laboratory classes: 30	2.0

Goals

C1	The aim of the course is the analysis and presentation of the actual knowledge and the requirements of the MSc thesis of each student
C2	Control of students progress in master thesis preparation and evaluation of its proceedings.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Typical technologies used in different food products production	NT_P7S_WK07	observation of student's work, active participation, presentation
W2	Methods for solving problems in food production including the legislation requirements	NT_P7S_WG01, NT_P7S_WG04, NT_P7S_WG05, NT_P7S_WK07	observation of student's work, active participation, presentation
Skills – Student can:			
U1	made the literature research connected with the topic of the master thesis	NT_P7S_UW01, NT_P7S_UW02	observation of student's work, active participation, presentation
U2	Analyze the results of its own rersearch	NT_P7S_UW02, NT_P7S_UW03	observation of student's work, active participation, presentation
U3	Student is able to use specialist nomenclature in a foreign language	NT_P7S_UK07	active participation
Social competences – Student is ready to:			
K1	Criticly analyze the results of its own rersearch	NT_P7S_KK01, NT_P7S_KOR3	observation of student's work, active participation

Balance of ECTS points

Activity form	Activity hours*
laboratory classes	30
presentation/report preparation	10
consultations	10
consultations on diploma paper	5
collecting and studying literature	5

Student workload	**Hours** 60	**ECTS** 2.0
Workload involving teacher	**Hours** 45	**ECTS** 1.7
Practical workload	**Hours** 30	**ECTS** 1.0

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. The determination of the reqirements for prezentation preparation and grading of the course 2. The deteremination of the formal reuiremants for the preparation master thesis dissertaion and apropriate bibliography 3-7. Student presentations of the theoretical part of the master thesis 8-12. Student presentations of the practical part and conducted research	laboratory classes

Course advanced

Teaching methods:

participation in research, presentation / demonstration, classes, discussion

Activities	Examination methods	Percentage in subject assessment
laboratory classes	observation of student’s work, active participation, presentation	100%

Literature

Obligatory

1. Scientific literature (books, articles) in the toipic of the research

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Forms of intellectual and industrial property

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI1HS.0739.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** mandatory
Study form Full-time	**Block** humanities and social sciences
Education profile General academic	**Subject related to scientific research** No
	Subject shaping practical skills Yes

Teacher responsible for the subject	Anna Kapała
Other teachers conducting classes	Anna Kapała

Period Semester 1	**Examination** graded credit **Activities and hours** lecture: 15	**Number of ECTS points** 1.0

Goals

C1	To acquaint students with intellectual property law, with legal possibilities to protect intellectual property, as well as to make students aware of the value of intellectual property.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	The student knows and understands the concepts and principles in the field of protection of industrial property and copyright and the need to manage intellectual property resources; can use patent resources	NT_P7S_WK06, NT_P7S_WK07	written credit, presentation
Skills – Student can:			
U1	The student is able to search and creatively use information from various fields of science with proper protection rights, including copyright.	NT_P7S_UW01	written credit, presentation
U2	The student is able to communicate with professionals also in English at the B2 + level of the European Educational Description System and use specific terminology in the field of intellectual property law	NT_P7S_UK07	written credit, presentation
Social competences – Student is ready to:			
K1	The student is ready to apply the acquired knowledge to obtain protection of his intellectual property and use someone else's intellectual property rights in accordance with the law.	NT_P7S_KO02	written credit, presentation

Balance of ECTS points

Activity form	Activity hours*	
lecture	15	
consultations	2	
exam / credit preparation	6	
presentation/report preparation	6	
Student workload	**Hours** 29	**ECTS** 1.0
Workload involving teacher	**Hours** 17	**ECTS** 0.6

* hour means 45 minutes

Study content

No.	Course content	Activities

1.	1. The concept of intellectual property, general background and sources: legislation 2.-3. Forms of intellectual property under international law 4.-5. Copyright in Polish law: Different categories of protected works, special categories of works, works excluded of protection 5.-6. Entity copyright (ownership), conditions of protection, content of copyright 7.-9. The concept of plagiarism, piracy, permitted personal and public use, criminal and civil law enforcement of copyright 10. Protection of industrial property law. Legislation, conditions of protection, formal requirements, the role of Polish Patent Office 11. Protection of trademarks (national, European and international) 12. Inventions, patents, industrial designs 13.-14. Design patterns, geographical indications of agricultural products and foodstuffs 15. Protection of biotechnological inventions	lecture

Course advanced

Teaching methods:

lecture, presentation / demonstration, text analysis, discussion, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written credit, presentation	100%

Literature

Obligatory

1. Legal acts: 1. Ustawa z dnia 4 lutego 1994 r. o prawie autorskim i prawach pokrewnych; 2. Ustawa z dnia 30 czerwca 2000 r. Prawo własności przemysłowej;
2. 2. Żakowska-Henzler H.: Wynalazek biotechnologiczny. Przedmiot patentu, Warszawa 2006;

Optional

1. P. Machnikowski, A. Górniczy-Mulcahy, 2017, Intellectual Property Law in Poland, 2nd ed. Kluwer Law International;
2. J.Embley, K. Bamford, N. Hancook, 2017, Commercial and intellectual property law and practice, Guildford: College of Law Publishing;

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Biotechnological advances in food production

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3226.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** No **Subject shaping practical skills** No

Teacher responsible for the subject	Wojciech Łaba
Other teachers conducting classes	Wojciech Łaba, José Ángel Pérez Álvarez

Period	**Examination**	**Number of ECTS points**
Semester 2	exam **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	This course provides insight into biotechnological techniques for preparing foods and food additives. It highlights advances in biotechnology, as well as the range of possibilities in the field of food production. The course presents production methods of specific food compounds for the preparation of functional foods and diverse applications of biotechnology in the fields of fermented foods of both animal and plant origin.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	biological and enzymatic methods used in various agri-food industries	NT_P7S_WG01, NT_P7S_WG02	written exam
W2	the effects of modification of food components on their functional, technological organoleptic and health properties	NT_P7S_WG04	written exam
W3	the legal basis for the use of enzymes in food production	NT_P7S_WK06	written exam
Skills – Student can:			
U1	conrast and interpret advances in agro-food biotechnology and their practical applications	NT_P7S_UW03	practical training report
U2	select a biocatalyst for specific applications from the range of commercial preparations	NT_P7S_UW04	practical training report
U3	incorporate scientific advances in food production and preparation that enable improving its quality and functionality	NT_P7S_UW04	practical training report
U4	is able to use professional terminology in a foreign language	NT_P7S_UK07	practical training report
Social competences – Student is ready to:			
K1	for innovative approach and creativity in the agro-food field	NT_P7S_KOR3	practical training report

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
class preparation	8
exam participation	1
exam / credit preparation	10
report preparation	10
collecting and studying literature	10
consultations	6

Student workload	Hours	ECTS
	75	3.0

Workload involving teacher	**Hours** 37	**ECTS** 1.3
Practical workload	**Hours** 20	**ECTS** 0.8

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Classical and modern biotechnology in food processing, legal aspects of the use of biocatalysis in food production. Food additives obtention through biotechnological techniques Cellular factories for the production of enzymes and biopreservatives Shaping the functional properties of proteins Bioactive peptides Enzymes in the dairy industry Enzymes in the dairy industry Enzymes in a bakery The use of biocatalysis in brewing Enzymes in juice technology	lecture
2.	Optimization of sucrose hydrolysis with immobilized β-fructofuranosidase	laboratory classes

Course advanced

Teaching methods:

computer lab/laboratory, lecture

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	50%
laboratory classes	practical training report	50%

Entry requirements

microbiology, biochemistry, enzymology

Literature

Obligatory

1. Shetty K., Paliyath G., Pometto A., Levin R.E. Food Biotechnology, 2nd Edition, Taylor & Francis 2006
2. Nagodawithana T., Reed G. Enzymes in Food Processing, 3rd Edition, Elsevier 2013

Optional

1. Aehle W. Enzymes in Industry: Production and Applications, 3rd Edition, Wiley 2007

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Biotechnology of animal production

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3227.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** Yes

Teacher responsible for the subject	Anna Dąbrowska
Other teachers conducting classes	Anna Dąbrowska, Maria José Argente Carrascosa

Period Semester 2	**Examination** graded credit **Activities and hours** lecture: 20 laboratory classes: 10	**Number of ECTS points** 3.0

Goals

C1	This course examines biotechnological techniques for preparing foods and food additives from quality raw materials. It delves into scientific advances in biotechnology, highlighting the range of possibilities in the field of food production that has been expanded by applying genetic engineering techniques. In this sense, the course presents production methods of specific additives for the preparation of new foods using biotechnology, and the diverse applications of biotechnology in the fields of fermented foods of both animal and plant origin. In addition, students are afforded knowledge so they become capable of optimizing preparation processes of new foods with biotechnology.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality. Understand and apply scientific advances in animal production to be used in R&D of animal production industries. Categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies. Conrast and interpret advances in agro-food biotechnology and their practical applications.	NT_P7S_WG01, NT_P7S_WG02, NT_P7S_WG04, NT_P7S_WG05, NT_P7S_WK06	written credit
Skills – Student can:			
U1	Use tools to search for relevant and reliable information to resolve problems, develop strategies, and advise agro-food industries. Integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_UW01, NT_P7S_UW05	written credit
U2	Student is able to use specialist nomenclature in a foreign language	NT_P7S_UK07	written credit
Social competences – Student is ready to:			
K1	Develop autonomous and lifelong learning in the agro-food field. Apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field. Capacity for innovation and creativity in the agro-food field.	NT_P7S_KO02, NT_P7S_KOR3	written credit

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
presentation/report preparation	10
lesson preparation	10

exam participation	2
consultations	5
class preparation	10
report preparation	10
collecting and studying literature	10

Student workload	**Hours** 87	**ECTS** 3.0
Workload involving teacher	**Hours** 37	**ECTS** 1.3
Practical workload	**Hours** 20	**ECTS** 0.8

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Classical and modern biotechnology in food processing Food additives obtention through biotechnological techniques Cellular factories for the production of enzymes and biopreservatives Practical applications in food processing Biotechnological advances in industries of animal origin (The role of the biotechnologist in industries of animal origin, Bioconservation of foods of animal origin, Pro and symbiotics, Microencapsulation of probiotic microorganisms, Animal cell cultures intended for human consumption, - "In vitro meat", Marine biorefineries, Advances in applied enzymology in the preparation of foods of animal origin, Biotechnological applications in the elaboration process of mimetics foods (analogues)of animal-based food.)	lecture
2.	Technological Innovation in Acquiring and Processing Raw Materials	laboratory classes

Course advanced

Teaching methods:

classes, lecture, discussion, teamwork

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
laboratory classes	written credit	50%

Entry requirements

General technology, dairy/meat/egg and poultry technology

Literature

Obligatory

1. Lee, Byong H., author. "Fundamentals of food biotechnology .
2. Mittal, Gauri S. "Food biotechnology techniques and applications". Lancaster ; Basel Technomic cop. 1992.
3. Stanbury, Peter F., author. Whitaker, Allan, author./Hall, Stephen J., author. "Principles of fermentation technology"
4. Sharma, Deepansh. author. Saharan, Baljeet Singh. author./Kapil, Shailly. author. "Biosurfactants of Lactic Acid Bacteria"
5. Charalampopoulos, Dimitris. editor./Rastall, Robert A. editor. "Prebiotics and Probiotics Science and Technology".

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Biotic and abiotic contamination of food

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3228.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** Yes

Teacher responsible for the subject	Anna Dąbrowska
Other teachers conducting classes	Anna Dąbrowska, Sendrá Nadal

Period	**Examination**	**Number of ECTS points**
Semester 2	exam **Activities and hours** lecture: 30 laboratory classes: 15	4.5

Goals

C1	This course addresses controlling food contamination, both due to its consequences upon human health as well as the economic losses that it may cost the food industry. Reducing losses from food contamination is a worldwide priority today, and this contamination can have microbial as well as chemical origin. Because of this, this course is divided into two blocks. Its first treats food as a microbial ecosystem, where a natural microbiota is present, related with the system of food production, processing, and transformation that can be modified by both intrinsic and extrinsic factors. This block places particular emphasis on the microorganisms that cause food deterioration in addition to diseases. The factors that affect the presence, survival, and growth of these microorganisms in food and detection systems are examined. The course's second block looks at controlling metals in food products, because although some metals provide unquestionable nutritional value, they can also be toxic, depending upon the concentrations in which they are found. Monitoring the chemical safety of foods can be defined as an analysis and assessment tool of the risks to health that derive from the presence of potentially dangerous substances in foods, which enables prioritizing control activities, even comparing the risks with others that we have to deal with on a daily basis.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Know the tools for scientific and legal information searches in agro-food technology. Know the biotic and abiotic contamination occuring in food Integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_WG01, NT_P7S_WG03, NT_P7S_WG05	written exam
Skills – Student can:			
U1	Develop and produce reports and procedures to manage food quality and safety based on continuous improvement. Develop autonomous and lifelong learning in the agro-food field. Plan research projects related to food quality and safety in agro-food technology. Formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products. Create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers. Assess indicators of biotic and abiotic contamination, and the factors that affect them in improving food safety.	NT_P7S_UK08, NT_P7S_UO06, NT_P7S_UW01, NT_P7S_UW02, NT_P7S_UW05	written exam
U2	Student is able to use specialist nomenclature in a foreign language	NT_P7S_UK07	written exam
Social competences – Student is ready to:			
K1	Understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality. Apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_KK01, NT_P7S_KO02, NT_P7S_KOR3	written exam

Balance of ECTS points

Activity form	Activity hours*

lecture	30
laboratory classes	15
presentation/report preparation	12
exam participation	2
consultations	12
lesson preparation	7
report preparation	17
collecting and studying literature	20

Student workload	**Hours** 115	**ECTS** 4.5
Workload involving teacher	**Hours** 59	**ECTS** 2.0
Practical workload	**Hours** 32	**ECTS** 1.1

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Microbial food intereactions 2. Microbial pathogens, emergent pathogens and detection techniques 3. Spoilage microbiota and their detection 4 ECOLOGICAL SYSTEMS AND POLLUTION. 1. Introduction. 2. Definition and classification of pollutants. 3. Bioaccumulators and biomagnification. 4. Mixtures of polluting compounds. 5. Lethal and sublethal effects. 6. Environmental factors that affect toxicity 5. FOOD CHEMICAL CONTAMINATION. 1. Introduction. 1.1 Background. 1.2 Biogeochemistry of metals. 2. Factors that influence the toxicity of heavy metals. 3. Dietary intake of trace metals. 3.1. Ways of incorporation into food.3.2. Toxicological effects.4. Intake estimates. Total Diet Studies.4.1 Toxicological reference values.4.2. Determination of intakes of contaminants in the diet.5. Chemical food safety group.5.1. Surveillance and control areas. 6. METALS TRAIL IN FOODS. 1. Cadmium. 1.1. Ingestion of cadmium in the diet. 1.2 Toxicity of cadmium. 1.3 Treatment of cadmium. 2. Lead 2.1. Ingestion of lead in the diet. 2.2 Toxicity of lead. 2.3 Treatment of lead. 3. Mercury. 3.1 Ingestion of mercury in the diet. 3.2 Toxicity of mercury. 3.3 Treatment of mercury. 4. Arsenic. 4.1 Arsenic intake in the diet. 4.2 Toxicity of arsenic. 4.3 Arsenic treatment. 5. Other metals trace contaminants. 6. Measures to reduce pollution.	lecture

2.	1. Predictive microbiology 2. Food microbiology lab, rapid methods in food microbiology 3. Preparation and digestion of food samples. 4. Description and tuning of the atomic absorption technique with hydride generation. 5. Description and tuning of the technique of speciation with fluorescence.	laboratory classes

Course advanced

Teaching methods:

classes, lecture, discussion, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	50%
laboratory classes	written exam	50%

Entry requirements

Microbiology

Literature

Obligatory

1. Whittle, Kevin J./Moffat, Colin F. "Environmental contaminants in food". Sheffield Sheffield Academic Press 1999. J.S Jean, J. Bundschuh and P. Bhattacharya. "Arsenic in Geosphere and Human Diseases". CRC Press.
2. Robinson, R. K. (Richard Kenneth)/Batt, Carl A./Patel, P. D. "Encyclopedia of food microbiology". San Diego [etc.] Academic Press 2000.
3. Doyle, Michael P./Buchanan, Robert L. "Food microbiology [electronic resource] : fundamentals and frontiers /". Washington, D.C. : ASM Press, 2013.
4. Pawsey, Rosa K. "Case studies in food microbiology for food safety and quality [electronic resource] /". Cambridge, U.K. : Royal Society of Chemistry, c2002.
5. Roberts, Diane/Greenwood, Melody. "Practical food microbiology". [Malden] Blackwell Publishing cop.2003

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Innovation in meat, dairy and fish production

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3229.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** Yes

Teacher responsible for the subject	Małgorzata Korzeniowska
Other teachers conducting classes	Małgorzata Korzeniowska, Marek Szołtysik, Sendrá Nadal

Period	**Examination**	**Number of ECTS points**
Semester 2	exam **Activities and hours** lecture: 30 laboratory classes: 15	4.5

Goals

C1	To know and to evaluate the innovation strategies that adapt to the new trends in food technology
C2	To know the newest trends in the development of healthier animal products
C3	To evaluate foods of animal origin in a view of the latest scientific advances and trends in research
C4	to connect the side streams valorization with the animal products processing

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Capacity for innovation and creativity in the agro-food field.	NT_P7S_WG01, NT_P7S_WG04, NT_P7S_WG05	active participation, presentation, participation in discussion
W2	Conrast and interpret advances in animal resources processing and biotechnology with their practical applications	NT_P7S_WG01, NT_P7S_WG02, NT_P7S_WG04	written exam, active participation, participation in discussion
W3	Create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers.	NT_P7S_WG01, NT_P7S_WG04, NT_P7S_WG05, NT_P7S_WK06	written exam, active participation, report
W4	Categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_WG01, NT_P7S_WG03	written exam, active participation, participation in discussion
W5	Understand and incorporate scientific advances in animal food production and preparation that enable improving its quality and functionality.	NT_P7S_WG03, NT_P7S_WG04, NT_P7S_WG05	written exam, active participation, participation in discussion
W6	Understand and apply scientific advances in animal production to be used in R&D of animal production industries.	NT_P7S_WG01, NT_P7S_WG05, NT_P7S_WK07	written exam, participation in discussion
Skills – Student can:			
U1	Use tools to search for relevant and reliable information to resolve problems, develop strategies, and advise agro-food industries.	NT_P7S_UO06, NT_P7S_UW01	active participation, participation in discussion
U2	Develop autonomous and lifelong learning in the agro-food field.	NT_P7S_UK08, NT_P7S_UW01	active participation, participation in discussion
U3	Apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_UW01, NT_P7S_UW03	active participation, participation in discussion
U4	Integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_UW01, NT_P7S_UW03	active participation, participation in discussion
Social competences – Student is ready to:			
K1	Critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality.	NT_P7S_KK01, NT_P7S_KO02, NT_P7S_KOR3	active participation, presentation, participation in discussion
K2	Taking professional actions regarding social and ethical repsonsibilities in the agro-food field.	NT_P7S_KO02	active participation, presentation, participation in discussion

K3	Is able to think creatively and responsibly	NT_P7S_KK01, NT_P7S_KOR3	active participation, presentation, participation in discussion

Balance of ECTS points

Activity form	Activity hours*	
lecture	30	
laboratory classes	15	
consultations	30	
lesson preparation	48	
Student workload	**Hours** 123	**ECTS** 4.5
Workload involving teacher	**Hours** 75	**ECTS** 3.0
Practical workload	**Hours** 15	**ECTS** 0.6

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Innovations in the processing and preservation of meat and meat products Design of healthier meat products Innovations in the processing of dairy products Development of dairy products Innovations in the processing and preservation of fishery products Development of new products from fishing sector New trends in animal derived side stream materials valorization Industrial symbiosis	lecture

2.	Production of meat products with low salt content Production of meat products with no or low nitrite content Production of meat products with healthy fats Fermented milks: effect of processing on the development of defects and detection Quality control in the development and evaluation of new products Characterization and evaluation of the technological aptitude of different products derived from fishing Preparation of new products from fishing raw materials Application of plant side-streams in meat and fish products technology	laboratory classes

Course advanced

Teaching methods:

teamwork, brainstorming, situation-based learning, project-based learning (PBL), problem-solving method, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	55%
laboratory classes	active participation, report, presentation, participation in discussion	45%

Entry requirements

meat, dairy and fish production and technology, food engeneering, (bio)chemistry,

Literature

Obligatory

1. Beckley, Jacqueline H. "Accelerating new food product design and development". Ames (Ia.) Blackwell 2007. (Open in a new window) Moskowitz, Howard R./ Saguy, Israel 1946-/ Straus, Tim. "An integrated approach to new food product development". Boca Raton CRC Press c2009. Datta, Nivedita, editor./Tomasula, Peggy, editor. "Emerging dairy processing technologies : opportunities for the dairy industry /".
2. Shortt, Colette/O'Brien, John. "Handbook of functional dairy products". Boca Raton Fl. CRC Press cop. 2004.
3. Roginski, Hubert edt. "Encyclopedia of dairy sciences". Amsterdam Academic Press 2003.
4. Hall, G. M. Dr. "Fish processing technology". Glasgow Blackie Academic and Professional 1992. (Open in a new window) Benítez Cuella, Martín. "Tecnología de pescados (UF1222) /".

Optional

1. Revista Dairy Science and Technology
2. Meat science
3. poultry science
4. fisheries journals
5. Journal of Dairy Science
6. Institute of Food Technologists

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Managment and funding of public and private research

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2HS.3231.24 **Lecture languages** english **Mandatory** mandatory **Block** humanities and social sciences **Subject related to scientific research** No **Subject shaping practical skills** Yes

Teacher responsible for the subject	Anna Michalska
Other teachers conducting classes	Anna Michalska, Pedro J Zapata Coll

Period Semester 2	**Examination** graded credit **Activities and hours** lecture: 20 laboratory classes: 10	**Number of ECTS points** 3.0

Goals

C1	Provide a knowledge about basic and applied research of agro-food technology
C2	Present the funding agencies at the national and international level
C3	Provide an up-to-date information about calls for proposals
C4	Provide a knowledge about project proposal preparation
C5	Aware the students about the evaluation criteria for projects evaluation in dependence of the type of funding agency
C6	Provide a knowledge about project proposal management

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	know the basic principle of project management	NT_P7S_WG01	participation in discussion
W2	know how to construct a project proposal	NT_P7S_WG02, NT_P7S_WK06	observation of student's work, active participation, presentation
W3	know the possibilities of applying for the funding of public and private research	NT_P7S_WK07	observation of student's work, active participation
W4	know how to find sources of public and private financing for scientific project	NT_P7S_WK06	observation of student's work
W5	to gain knowledge about the management of the granted proposals (reporting, evaluation)	NT_P7S_WG02, NT_P7S_WG04	observation of student's work, participation in discussion
Skills – Student can:			
U1	has the ability to prepare project proposal, create a hypotheses and aim	NT_P7S_UK08, NT_P7S_UO06	observation of student's work, presentation
U2	has the ability to search for the funding agency in dependence on the type of research	NT_P7S_UW01	participation in discussion
U3	has the ability to construct the project proposal for agri-food research	NT_P7S_UO06, NT_P7S_UW01	observation of student's work
U4	has ability to manage the project, when granted	NT_P7S_UW02	observation of student's work, active participation
U5	has an ability to use a specific terminology in English	NT_P7S_UK07	observation of student's work, active participation, presentation, participation in discussion
Social competences – Student is ready to:			
K1	able to prepare independently project proposal including critical and self-critical evaluation of scientific advances	NT_P7S_KK01	observation of student's work, presentation, participation in discussion

K2	able to plan the research project	NT_P7S_KOR3	observation of student's work, active participation
K3	able to manage the project	NT_P7S_KO02	active participation, participation in discussion

Balance of ECTS points

Activity form	**Activity hours***
lecture	20
laboratory classes	10
presentation/report preparation	10
consultations	2
project preparation	30
literature study	10

Student workload	**Hours** 82	**ECTS** 3.0
Workload involving teacher	**Hours** 32	**ECTS** 1.1
Practical workload	**Hours** 10	**ECTS** 0.4

* hour means 45 minutes

Study content

No.	**Course content**	**Activities**
1.	(1) The possibilities to find funds for scientific research (2) General rules of project proposal writing – the structure of the project proposal, the requirements of the individual funding agency (3) Construction of the project proposal elements: abstract, research plan, budget, formation of the research team (4) General rules of the project proposals' online submission (5) Rules of the evaluation of the project proposals in dependence of the funding agency (6) The criteria of the proposal evaluations (7) Management of the project	lecture

2.	Preparation of the project proposal elements: • abstract, • research plan, • budget, • formation of the research team, • data menagement plan	laboratory classes

Course advanced

Teaching methods:

blended learning, lecture, discussion, teamwork, presentation / demonstration, situation-based learning, brainstorming

Activities	Examination methods	Percentage in subject assessment
lecture	participation in discussion	30%
laboratory classes	observation of student’s work, active participation, presentation	70%

Literature

Obligatory

1. Yavuz Oruç, A. (2012) Handbook of Scientific Proposal Writing, CRC Press, Boca Raton
2. documentation of the calls, regulations of the individual calls (national and international funding agencies: NCN, NCBR, H2020, NAWA)
3. Elisabeth Rajala, Isabel Vogel, Anneli Sundin, Daovy Kongmanila, Maria G. Nassuna-Musoke, Robert Musundire, Marianne Nasha Mulangala, Linley Chiwona-Karltun, Ulf Magnusson, Sofia Boqvist (2021) How can agricultural research translation projects targeting smallholder production systems be strengthened by using Theory of Change?, Global Food Security, 28, 100475, https://doi.org/10.1016/j.gfs.2020.100475.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Pre/post harvest eco-innovative treatments

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI2BO.3234.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** mandatory
Study form Full-time	**Block** major subjects (conducted) in foreign languages
Education profile General academic	**Subject related to scientific research** No
	Subject shaping practical skills Yes

Teacher responsible for the subject	Anna Michalska, Paulina Nowicka, Aneta Wojdyło
Other teachers conducting classes	Anna Michalska, Paulina Nowicka, Salvador Castillo García

Period	**Examination**	**Number of ECTS points**
Semester 2	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	This course, which addresses two different parts on improving the quality of plant products, has as principal condition that the plant techniques, products, and handling is natural, which will make it into an organic tool or one susceptible to becoming one. This course's contents present the latest advances in research on pre-harvest factors, including deficit irrigation techniques, exogenous treatment with natural hormones, application of natural compounds, and modifications in cultivation techniques that influence the quality at harvest time and during subsequent post-harvest conservation. Likewise, the latest research on post-harvest tool use for maximizing and/or maintaining plant quality for longer periods is an object of study, and others include the use of natural compounds, essential oils, and physical treatments (ozone, carbon dioxide, low oxygen, etc.).

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	- integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers. - categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies. - understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality.	NT_P7S_WG01, NT_P7S_WG03, NT_P7S_WG04	written credit, active participation, presentation, participation in discussion, practical training report
Skills – Student can:			
U1	develop autonomous and lifelong learning in the agro-food field. plan research projects related to food quality and safety in agro-food technology. formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UK08, NT_P7S_UO06, NT_P7S_UW03	active participation, participation in discussion, practical training report
Social competences – Student is ready to:			
K1	critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality. capacity for innovation and creativity in the agro-food field.	NT_P7S_KK01, NT_P7S_KOR3	project, active participation, presentation, participation in discussion, practical training report

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
exam / credit preparation	40
consultations	2
lesson preparation	10

Student workload	**Hours** 82	**ECTS** 3.0
Workload involving teacher	**Hours** 32	**ECTS** 1.1
Practical workload	**Hours** 10	**ECTS** 0.4

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Effect of mineral nutrition and plant development. Effect of calcium and mineral deficiencies in the quality of the fruits. Effect of the state of maturation on quality. Effect of variety on quality. Objectives of the pre-harvest treatments in the quality of fruits and vegetables. Effect of plant hormones and treatments with plant hormones in post-harvest quality of fruits and vegetables. Effect of pre-harvest treatments with organic acids on the quality of fruits and vegetables.	lecture
2.	Analysis of basic chemical components of storage fruits and vegetables. Effect of technological treatment on quality fruits and vegetables.	laboratory classes

Course advanced

Teaching methods:

teamwork, classes, lecture, participation in research, discussion, presentation / demonstration, project-based learning (PBL)

Activities	Examination methods	Percentage in subject assessment
lecture	written credit, project, active participation, participation in discussion	50%
laboratory classes	project, active participation, presentation, participation in discussion, practical training report	50%

Entry requirements

Technologial Innovation in Food Production

Literature

Obligatory

1. Díaz Mula, Huertas María. Serrano Mula, María dir./Valero Garrido, Daniel codir. "Bioactive compounds, antioxidant activity and quality of plum and sweet cherry cultivars as affected by ripening on-tree, cold storage and postharvest treatments". Orihuela Escuela Politécnica Superior de Orihuela, Departamento de Tecnología Agroalimentaria 2011. (Open in a new window)
2. Sharma, Neeta, Dr., editor. "Biological controls for preventing food deterioration : strategies for pre- and postharvest management /". Siddiqui, Mohammed Wasim, editor. "Eco-friendly technology for postharvest produce quality /".

Optional

1. Postharvest technology, Food Chemistry, Food Quality

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Aromatic profile in food and its relationship with quality

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3285.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Pudło
Other teachers conducting classes	Anna Pudło, Pedro J Zapata Coll

Period Semester 2	**Examination** exam **Activities and hours** lecture: 20 laboratory classes: 10	**Number of ECTS points** 3.0

Goals

C1	This course permits students to attain maximum information on the smell and aroma of raw materials and commercial products, in addition to evaluating the effect of each unit operation on the odoriferous or aromatic quality of foods. However, volatile compounds are very sensitive, and can undergo many reactions that generate artifacts (oxidation, dehydration, Maillard reactions, polymerization, and isomeric changes) during their extraction and analysis. Therefore, controlling and dominating the processes of isolation, identification, and quantification of these sensitive and delicate compounds is necessary. This course details the main methods for isolating volatile compounds and those that are most appropriate for the main food matrices. Furthermore, analytical techniques are advancing rapidly, but a thorough understanding of gas chromatography and its various types of detectors is essential for knowing whether their use in identifying or quantifying volatile compounds is possible. For example, gas chromatography with a mass spectrometry detector (in scan mode) is not an appropriate technique for quantifying these types of compounds although in the literature there are hundreds of papers that have used them for that.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers	NT_P7S_WG01	written exam
W2	understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality.	NT_P7S_WG04	written exam
W3	categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_WG03	written exam
Skills – Student can:			
U1	know the tools for scientific and legal information searches in agro-food technology.	NT_P7S_UW01	written exam, observation of student’s work, report
U2	formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UW03	written exam, observation of student’s work, report
U3	develop and use tools to assess co-products in the agro-food industry.	NT_P7S_UW05	written exam, observation of student’s work, report
U4	The graduate can communicate abilities with professionals also in foreign language at B2 + level of the European Training Description System and to a higher degree use a specific terminology	NT_P7S_UK07	written exam, observation of student’s work, report
Social competences – Student is ready to:			
K1	critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality.	NT_P7S_KK01	observation of student’s work
K2	apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_KO02	observation of student’s work
K3	capacity for innovation and creativity in the agro-food field.	NT_P7S_KOR3	observation of student’s work

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
consultations	5
report preparation	10
exam / credit preparation	20
class preparation	5
literature study	5
lesson preparation	5

Student workload	**Hours** 80	**ECTS** 3.0
Workload involving teacher	**Hours** 35	**ECTS** 1.2
Practical workload	**Hours** 20	**ECTS** 0.8

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Extraction of volatile compounds 1. Extraction with organic solvents of different polarityDistillation techniques: i) Steam distillation distillation: Clevenger and Deryng devices, ii) Simultaneous distillation-extraction: Likens Nickerson equipment, and iii) Vacuum distillation 2. Head space techniques: i) Dynamic head space: intact fruits, ii) HS-SPME (solid phase microextraction for headspace) and iii) SPME (solid phase microextraction) 3. Evaluation of the creation of artifacts during the extraction process Identification and quantification of volatile compounds 4. Identification: Gas chromatography with mass spectrometry detector: GC-MS in scan mode; GC-MS with sniffing port: identification of active odorant compounds; and artifacts. 5. Quantification: GC-MS in SIM mode (single ion monitoring); GC-FID with internal standard users and calibratge rectes	lecture

2.	Extraction of volatile compounds 1. Extraction of volatile compounds with Deryng apparatus and analysis by GC-MS, and Likens-Nickerson and analysis by GC-MS 2. Extraction of volatile compounds with HS-SPME and by vacuum distillation, and analysis by GC-MS Identification and quantification of volatile compounds 3. Processing of a chromatogram of a fresh food and another processed. 4. Realization of calibrated lines of standards by chemical families (aldehydes, ketones, esters, etc.)	laboratory classes

Course advanced

Teaching methods:

participation in research, teamwork

Activities	Examination methods	Percentage in subject assessment
lecture	written exam, observation of student’s work	30%
laboratory classes	written exam, observation of student’s work, report	70%

Entry requirements

biochemistry, organic and inorganic chemistry, food technology

Literature

Obligatory

1. Etiévant, P. (Patrick), editor./Guichard, Elisabeth, editor/Salles, Christian, editor./Voilley, Andrée., editor. "Flavor : from food to behaviors, wellbeing and health /". Clarke, Ronald J. Bakker, Jokie. "Química del flavor del vino". Zaragoza Acribia imp. 2010.
2. Clarke, Ronald J. Bakker, Jokie. "Química del flavor del vino". Zaragoza Acribia imp. 2010.
3. Charalambous, George 1922- ed. lit./Inglett, G. E. 1928- ed. lit. "Flavor of foods and beverages chemistry and technology". New York [etc.] Academic Press 1978.
4. Fisher, Carolyn. Scott, Thomas R. "Flavores de los alimentos Biología y química". Zaragoza Acribia D.L.2000.

Optional

1. Gómez Pérez, María Teresa. Carbonell Barrachina, Ángel Antonio dir. "Determinación de la composición volátil de Pistacho mediante cromatografía de gases y detectores de espectometría de masas e ionización de llama". Orihuela 2011.
2. Hernández Alcocer, Eva María. Carbonell Barrachina, Ángel Antonio dir./ Signes Pastor, Antonio José codir. "Destilación a vacío y destilación-extracción simultánea en la determinación de perfiles aromáticos de alimentos". Orihuela 2007.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Chromatographic analysis of volatiles in food, agricultural and pharmacy

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3286.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Antoni Szumny
Other teachers conducting classes	Antoni Szumny, Jacek Łyczko

Period Semester 2	**Examination** exam **Activities and hours** lecture: 20 laboratory classes: 10	**Number of ECTS points** 3.0

Goals

C1	To acquaint students with the methods of isolation of volatile compounds from the material.
C2	To make the audience aware of the problems associated with the identification and quantification of isolated volatile compounds.
C3	Providing students with knowledge on methods and parameters of chromatographic separation of volatile compounds.
C4	To make the audience aware of sensory quality issues depending on the volatile compound profile.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the methods of isolation of volatile compounds from raw materials.	NT_P7S_WG01, NT_P7S_WG02	written exam, oral exam
W2	how to interpret the chromatograms and mass spectra obtained from the analyses.	NT_P7S_WG04	written exam, oral exam
W3	the theoretical basis of gas chromatography and mass spectrometry techniques.	NT_P7S_WG01	written exam, oral exam
Skills – Student can:			
U1	to search in scientific sources for information necessary to confirm the results of the analysis of the results.	NT_P7S_UW01	observation of student’s work, report
U2	plan an experiment involving the isolation of volatile compounds from raw materials and conduct GC-MS analysis.	NT_P7S_UO06	observation of student’s work, report
U3	prepare a comprehensive report presenting the results of GC-MS analysis of volatile compounds and translate the results into information on the quality of the raw material.	NT_P7S_UW02	observation of student’s work, report
U4	can solve difficulties and optimize the process of chromatographic analysis.	NT_P7S_UW01	observation of student’s work, report
U5	use correct analytical nomenclature, related to gas chromatography and mass spectrometry	NT_P7S_UK07	observation of student’s work, report
Social competences – Student is ready to:			
K1	present his results to the group, including the explanation of individual elements of the project.	NT_P7S_KK01	observation of student’s work
K2	take responsibility for the reliability of the analyses performed and the interpretation of the prepared results.	NT_P7S_KO02	observation of student’s work
K3	take initiative in designing analyses and experiments so that the technological problems posed can be solved.	NT_P7S_KOR3	observation of student’s work

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
report preparation	20
literature study	5
collecting and studying literature	10
conducting research	10
project preparation	5

Student workload	**Hours** 80	**ECTS** 3.0
Workload involving teacher	**Hours** 30	**ECTS** 1.0
Practical workload	**Hours** 40	**ECTS** 1.5

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Essential oils and volatile organic compounds: properties, technology and production. 2. Volatile compounds isolation: methods, procedures and optymalization 3. Gas chromatography and mass spectrometry 4. GC-MS analytical method development 5. GC-MS analysis results interpretation	lecture
2.	1. Isolation of volatile compounds: SPME, hydrodistillation, solvent extraction 2. GC-MS method development and samples analysis 3. Chromatograms interpretation and results reporting.	laboratory classes

Course advanced

Teaching methods:

project-based learning (PBL), lecture, discussion, computer lab/laboratory, teamwork, problem-solving method,

brainstorming, text analysis, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written exam, oral exam	60%
laboratory classes	observation of student’s work, report	40%

Literature

Obligatory

1. Adams, R.P. Dentification Of Essential Oil Components By Gas Chromatography/ Mass Spectrometry; 4.1.; Allured publishing: Carol Stream, 2017; Vol. 24; ISBN 9781932633214.
2. Handbook of Essential Oils. Science, Technology, and Applications; Başer, K.H.C., Gerhard Buchbauer, Eds.; 2nd ed.; CRC Press: Boca Raton, 2016; ISBN 9781466590472.
3. Handbook of Advanced Chromatography/Mass Spectrometry Techniques; Holcapek, M., Byrdwell, C., Eds.; Academic Press and AOCS Press: London, 2017; ISBN 9781626239777.
4. Rubiolo, P.; Sgorbini, B.; Liberto, E.; Cordero, C.; Bicchi, C. Essential oils and volatiles: Sample preparation and analysis. A review. Flavour Fragr. J. 2010, 25, 282–290, doi:10.1002/ffj.1984.
5. Mass Spectrometry: An Applied Approach; Smoluch, M., Grasso, G., Suder, P., Silberring, J., Eds.; 2nd ed.; John Wiley & Sons, Inc.: Hoboken, 2019; ISBN 978-1-119-37736-8.

Optional

1. Cserháti, T. Chromatography of Aroma Compounds and Fragrances; Springer-Verlag: Berlin, 2010; ISBN 9783642016554.
2. Mondello, L.; Tranchida, P.Q.; Dugo, P.; Dugo, G. Comprehensive two-dimensional gas chromatography-mass spectrometry: A review. Mass Spectrom. Rev. 2008, 27, 101–124, doi:10.1002/mas.20158.
3. Essential Oils in Food Preservation, Flavor and Safety; Preedy, V.R., Ed.; Academic Press: London, 2016; ISBN 9780124166417.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Bioactive compounds with antioxidant proporties

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI2BO.3239.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** optional
Study form Full-time	**Block** major subjects (conducted) in foreign languages
Education profile General academic	**Subject related to scientific research** Yes
	Subject shaping practical skills No

Teacher responsible for the subject	Anna Michalska, Paulina Nowicka
Other teachers conducting classes	Anna Michalska, Paulina Nowicka, Pedro J Zapata Coll

Period	**Examination**	**Number of ECTS points**
Semester 2	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	Provide a knowledge about bioactive compounds and antioxidants
C2	Present the methods used for determination of in vitro antioxidant capacity of agri-food products
C3	Provide an information about quantification and identification techniques for bioactive compounds in food products
C4	Provide a knowledge about influence of the processing on bioactive compounds and antioxidants in foods
C5	Provide knowledge about the connection between bioactive compounds and human health

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	acquire the knowledge about natural source of bioactive compounds and antioxidants	NT_P7S_WG01	active participation, participation in discussion
W2	know the analytical techniques to identify and quantify bioactive compounds	NT_P7S_WG02, NT_P7S_WK06	active participation, participation in discussion
W3	know the mechanisms of the methods used for determination of in vitro antioxidant capacity of agri-food products	NT_P7S_WG01, NT_P7S_WG02	active participation, participation in discussion
W4	know the influence of processing on bioactive compounds and antioxidants in the maintenance of functional properties	NT_P7S_WG04, NT_P7S_WG05	active participation, participation in discussion
Skills – Student can:			
U1	has the ability to extract bioactive compounds	NT_P7S_UW02, NT_P7S_UW05	active participation, report, participation in discussion, performing tasks
U2	has the ability to evaluate the content of selected groups of bioactive compounds	NT_P7S_UW03, NT_P7S_UW05	active participation, report, participation in discussion, performing tasks
U3	has the ability to differentiate the methods for determination of antioxidant capacity	NT_P7S_UW01	active participation, report, test, participation in discussion, performing tasks
U4	has the ability to determine antioxidant capacity of agri-food products by common methods	NT_P7S_UW03, NT_P7S_UW05	active participation, report, test, participation in discussion, performing tasks
U5	has an ability to use a specific terminology in English	NT_P7S_UK07	active participation, report, test, participation in discussion, performing tasks
Social competences – Student is ready to:			

K1	Able to adjust the extraction process in dependence of the type of bioactive compounds	NT_P7S_KK01	test
K2	Able to perform analytical determination of bioactive compounds and antioxidant capacity	NT_P7S_KK01	test
K3	Able to design process parameters in order to maintain the content of bioactive compounds and antioxidants	NT_P7S_KO02	test

Balance of ECTS points

Activity form	**Activity hours***
lecture	20
laboratory classes	10
consultations	5
collecting and studying literature	25
exam participation	5
class preparation	10

Student workload	**Hours** 75	**ECTS** 3.0
Workload involving teacher	**Hours** 40	**ECTS** 1.5
Practical workload	**Hours** 10	**ECTS** 0.4

* hour means 45 minutes

Study content

No.	**Course content**	**Activities**
1.	(1) Characterisation of bioactive compounds and antioxidant in agri-food products (2) Extraction methods (3) Analytical techniques to determine bioactive compounds (4) Analytical techniques for determination of antioxidant capacity (5) Functional foods and nutraceuticals (6) Changes in compounds bioactives during its development, post-harvest and process of fruits and vegetables (7) Innovations in design of agri-food products with improved content of bioactives and antioxidants	lecture
2.	(1) Determination of major groups of bioactive compounds (2) Evaluation of antioxidant capacity of agri-food products (3) Influence of the processing on the bioactive compounds and	laboratory classes

Course advanced

Teaching methods:

blended learning, blended learning, classes, lecture, participation in research, discussion, problem-solving method

Activities	Examination methods	Percentage in subject assessment
lecture	active participation, report, participation in discussion	60%
laboratory classes	test, performing tasks	40%

Literature

Obligatory

1. D. Valero Garrido, M. Serrano Mula (2010) Postharvest biology and technology for preserving fruit quality. Boca Raton, FL Taylor & Francis Group.
2. H. Dominguez, M. Gonzalez Munoz (2018) Water Extraction of Bioactive Compounds. Elsevier.
3. M. Carocho, P. Morales, I. C.F.R. Ferreira (2018) Antioxidants: Reviewing the chemistry, food applications, legislation and role as preservatives, Trends in Food Science & Technology, 71, 107-120.
4. Horszwald A., Andlauer W. (2011) Characterisation of bioactive compounds in berry juices by traditional photometric and modern microplate methods. Journal of Berry Research, 1, 189–199.

Optional

1. Majerska J., Michalska A., Figiel A. (2019) A review of new directions in managing fruit and vegetable processing by-products. Trends in Food Science and Technology, 88, 207-219.
2. Michalska A., Lech K. (2020) Spray drying of antioxidant rich foods (Taylor & Francis Group). Chapter 4, Handbook on Spray Drying Applications for Food Industries, Ed. M. Selvamuthukumaran,

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Nutraceuticals and functional food ingredients

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3240.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** Yes

Teacher responsible for the subject	Paulina Nowicka, Anna Michalska, Aneta Wojdyło
Other teachers conducting classes	Paulina Nowicka, Anna Michalska

Period	**Examination**	**Number of ECTS points**
Semester 2	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	The students who pass this subject will be able to carry out in an autonomous way a bibliographic search that allows them to determine which tools in pre and post-harvest are susceptible to increase the quality and useful life of the fruits and vegetables with which they work, being able to put in Innovation and Development in the industry march to improve it

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	- combine expertise in food production and technology to offer scientific and technical guidance to both producers and consumers	NT_P7S_WG01, NT_P7S_WG04	active participation, participation in discussion, case study
Skills – Student can:			
U1	- define the difference between functional food and nutraceuticals - communicate with professionals also in foreign language in a filed of nutraceutical and functional foods - create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers.	NT_P7S_UK07, NT_P7S_UW04	active participation, presentation, participation in discussion, case study
Social competences – Student is ready to:			
K1	- to design technological approach towards nutraceuticals and functional foods ingredients production - the ability to critically evaluate, self-reflect, and make decisions regarding scientific progress in agro-food technology and quality - the ability to innovate and demonstrate creativity within the agro-food sector.	NT_P7S_KK01, NT_P7S_KOR3	active participation, report, presentation, participation in discussion, case study

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
presentation/report preparation	30
exam / credit preparation	20

Student workload	**Hours** 80	**ECTS** 3.0
Workload involving teacher	**Hours** 30	**ECTS** 1.0
Practical workload	**Hours** 10	**ECTS** 0.4

* hour means 45 minutes

Study content

No.	Course content	Activities

1.	1. Isolation and purification some bioactive compounds: polyphenols 2. Analysis bioactive compounds by UPLC or LC-MS techniques. 3. Analysis pro-health potential by spectrophotometric methods. 4. Analysis basic chemical composition and physicochemical properties by instrumental methods.	laboratory classes
2.	1. Nutraceuticals - definitions and classification 2-3. Bioactive compounds contained in food of plant origin - polyphenols 4-5. Bioactive compounds contained in food of plant and animal origin - vitamins 6-7. Bioactive compounds contained in food of plant and animal origin - sterols and stanols, fatt acids, omega 3, 6, 9 8-9. Bioactive compounds contained in food - prebiotics, probiotics, synbiotic 10. Other bioactive compounds contained in food. 11-13. Sources of bioactive components – plants (vegetable, fruits, mushrooms, herbs) 14-15. Superfruits 16-18. Technological solutions in the production of functional food and supplements. 19-20. Overview of functional foods and plant-derived nutraceuticals available on the market.	lecture

Course advanced

Teaching methods:

teamwork, educational film, classes, lecture, discussion, project-based learning (PBL), problem-solving method, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	active participation, report, presentation, participation in discussion, case study	60%
laboratory classes	active participation, report	40%

Entry requirements

This course addresses the determination of biochemical components that are found in foods and that are considered compounds with beneficial properties for human health due their antioxidant capacity. Included among this group of compounds are polyphenols, phytosterols, vitamins, especially carotenoids and tocopherols and others as minerals. Students examine different analytical techniques used in determining biochemical components of foods, such as absorption spectroscopy (AS), gas chromatography (GS), high-performance liquid chromatography (HPLC), and gas chromatography-mass spectrometry (GC-MS). Once the theoretical knowledge is assimilated, students complete their training by establishing a practical program in which they carry out determined extractions of compounds, their subsequent purification, and qualitative and quantitative determinations by using either the internal or external standard, as well as preparing calibration lines of chemically pure compounds.

Literature

Obligatory

1. Díaz Mula, Huertas María. Serrano Mula, María dir./Valero Garrido, Daniel codir. "Bioactive compounds, antioxidant activity and quality of plum and sweet cherry cultivars as affected by ripening on-tree, cold storage and postharvest treatments". Orihuela Escuela Politécnica Superior de Orihuela, Departamento de Tecnología Agroalimentaria 2011.
2. Nasri H., Baradaran A., Shirzad H., Rafieian-Kopaei M. New Concepts in Nutraceuticals as Alternative for Pharmaceuticals. Int J Prev Med. 2014, 5, 1487-1499

Optional

1. Food Chemistry, Journal of Functional Foods, Trends in Food Science, LWT

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Eddible coatings

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3242.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Zimoch-Korzycka
Other teachers conducting classes	Anna Zimoch-Korzycka, Pedro J Zapata Coll

Period	**Examination**	**Number of ECTS points**
Semester 2	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	The aim of the course is to provide, verify and consolidate the knowledge and skills and the acquisition of social competences in the lastest developments in biobased edible materials and their applications in food packaging.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_WG01	written credit, observation of student’s work, test
W2	categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_WG03	written credit, active participation, test
Skills – Student can:			
U1	use tools to search for relevant and reliable information to resolve problems, develop strategies, and advise agro-food industries.	NT_P7S_UW01	written credit, report, test
U2	develop and produce reports and procedures to manage food quality and safety based on continuous improvement.	NT_P7S_UW02	observation of student’s work, report, test
U3	develop autonomous and lifelong learning in the agro-food field.	NT_P7S_UK08	observation of student’s work, report
U4	formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UW03	written credit, report, test
U5	plan research projects related to food quality and safety in agro-food technology.	NT_P7S_UO06	written credit, active participation, report, test
U6	create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers.	NT_P7S_UW04	report
Social competences – Student is ready to:			
K1	critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality.	NT_P7S_KK01	written credit, active participation, report
K2	capacity for innovation and creativity in the agro-food field.	NT_P7S_KOR3	written credit, active participation, report

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
exam / credit preparation	30
exam participation	1
report preparation	8

consultations	4
class preparation	3

Student workload	**Hours** 76	**ECTS** 3.0
Workload involving teacher	**Hours** 35	**ECTS** 1.2
Practical workload	**Hours** 18	**ECTS** 0.7

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Interaction phenomena between packaging and product 2. Advantages and disadvantages of packaging materials in products 3. Edible materials for food packaging 4. Edible films and coatings production 5. Edible films and coatings for fruits and vegetables 6. Edible films and coatings for meat and poultry 7. Edible films and coatings for flavor encapsulation 8. Delivery of flavor, active ingredients, food additives and antimicrobials using edible films and coatings 9. Physicochemical properties of edible films and coatings 10. Testing methods for edible packaging materials	lecture
2.	1. Edible films and coatings - concept and production. 2. Testing of edible films and coatings - physicochemical properties. 3. Credit - test.	laboratory classes

Course advanced

Teaching methods:

classes, lecture, participation in research, teamwork

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
laboratory classes	observation of student’s work, active participation, report, test	50%

Entry requirements

General food microbiology
Food storage
Mechanics science of food industry
General and food microbiology
Food hygiene and toxicology

Literature

Obligatory

1. Edible Films and Coatings for Food Applications. Milda E. Embuscado, Kerry C. Huber., Springer Science+Business Media, LLC 2009
2. Bio-based Materials for Food Packaging. Green and Sustainable Advanced Packaging Materials. Shakeel A. Springer Nature Singapore Pte Ltd., 2018.

Optional

1. https://www.packagingdigest.com/food-packaging
2. https://www.foodpackagingforum.org
3. https://pakfactory.com

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Innovative packaging

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3243.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Zimoch-Korzycka
Other teachers conducting classes	Anna Zimoch-Korzycka, Salvador Castillo García

Period	**Examination**	**Number of ECTS points**
Semester 2	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	The aim of the course is to provide, verify and consolidate the latest knowledge and skills and the acquisition of social competences in the field of innovative food packaging techniques about their way of preservative action, effectiveness and suitability in various types of foods.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_WG01	written credit, active participation, report, test
W2	categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_WG03	written credit, report, test
W3	understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality.	NT_P7S_WG04	observation of student’s work, report
W4	know the tools for scientific and legal information searches in agro-food technology.	NT_P7S_WK06	written credit, active participation, test
Skills – Student can:			
U1	formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UW03	written credit, report, test
U2	plan research projects related to food quality and safety in agro-food technology.	NT_P7S_UO06	written credit, report, test
U3	develop and use tools to assess co-products in the food industry.	NT_P7S_UW02	observation of student’s work, report
U4	categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_UW03	active participation, test
Social competences – Student is ready to:			
K1	capacity for innovation and creativity in the food packaging technology.	NT_P7S_KOR3	written credit, active participation, report
K2	apply knowledge acquired and form judgments that include reflection on social and ethical responsibilities in the food packaging.	NT_P7S_KO02	written credit, active participation, report

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
exam / credit preparation	30
exam participation	1
report preparation	10
consultations	4

Student workload	**Hours** 75	**ECTS** 3.0
Workload involving teacher	**Hours** 35	**ECTS** 1.2
Practical workload	**Hours** 20	**ECTS** 0.8

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Basic function of packaging 2. Active packaging 3. Intelligent packaging 4. Bioactive packaging 5. Innovative packaging technologies 6. Interactions of active/intelligent packaging with supply chain 7. Nanotechnologies in food packaging 8. Food safety issues 9. Environmental issues (biosourced, biodegradable, recyclable) 10. Future trends	lecture
2.	1. Innovative natural packaging materials - concept and production. 2. Synthetic or natural packaging materials - which has better physicochemical properties? 3. Modified atmospheres packaging of fresh food - obtaining and calculating. 4. Vacuum or modified atmosphere packaging? - study. 5. Credit - test.	laboratory classes

Course advanced

Teaching methods:

classes, lecture, participation in research, teamwork

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
laboratory classes	observation of student’s work, active participation, report, test	50%

Entry requirements

General food microbiology,
Mechanics science of food industry,
General and food microbiology,
Food storage,
Food hygiene and toxicology

Literature

Obligatory

1. Food packaging technology. Coles R., McDwell D., Kirwan M.J., Blackwell Publishing, CRC Press, 2003.
2. Food packaging: principles and practice, Robertson G.L., Marcel Dekker Inc.,2013.
3. Bio-based Materials for Food Packaging. Green and Sustainable Advanced Packaging Materials. Shakeel A. Springer Nature Singapore Pte Ltd., 2018.

Optional

1. https://www.packagingdigest.com/food-packaging
2. https://pakfactory.com
3. https://www.foodpackagingforum.org

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Production of food enriched in dietary fiber

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3245.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** No **Subject shaping practical skills** Yes

Teacher responsible for the subject	Radosław Spychaj
Other teachers conducting classes	Radosław Spychaj, José Ángel Pérez Álvarez

Period Semester 2	**Examination** graded credit **Activities and hours** lecture: 20 laboratory classes: 10	**Number of ECTS points** 3.0

Goals

C1	Participation in the course allows you to obtain knowledge related to the meaning of dietary fiber, its different types and its composition, health benefits that are associated with the consumption of fiber-rich foods. This course strives for is to establish the scientific basis for the development of foods fortified with dietary fiber.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	knows in depth the unit operations of technological processes as well as development trends used in production of food enriched in dietary fiber to provide scientific and technical advice to producers and consumers	NT_P7S_WG01	written credit, observation of student's work, report
W2	know the tools for scientific and legal information searches in high fiber-food technology	NT_P7S_WK06	written credit, observation of student's work, report
W3	understand and incorporate scientific advances in high-fibre food production and preparation that enable improving its quality and functionality.	NT_P7S_WG04	written credit, observation of student's work, report
Skills – Student can:			
U1	know the tools for scientific and legal information searches in high fibre-food technology.	NT_P7S_UW01	written credit, observation of student's work, report
U2	create procedures for incorporating dietary fiber preparations into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers.	NT_P7S_UW04	written credit, observation of student's work, report
Social competences – Student is ready to:			
K1	capacity for innovation and creativity in the high fibre-food field	NT_P7S_KOR3	written credit, observation of student's work, report

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
consultations	2
exam participation	3
report preparation	10
lesson preparation	5
exam / credit preparation	40

Student workload	**Hours** 90	**ECTS** 3.0
Workload involving teacher	**Hours** 35	**ECTS** 1.2

Practical workload	Hours 20	ECTS 0.8

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Lecture 1. Definition, classification and composition of dietary fiber. Lecture 2. Determination methods of dietary fiber in foods. Lecture 3. Physiological and metabolic effects of dietary fiber 1. Lecture 4. Physiological and metabolic effects of dietary fiber 2. Lecture 5. Dietary Fiber in the prevention and treatment of disease. Lecture 6. Sources of dietary fiber to application in foods. Lecture 7. Technofunctional properties of dietary fibers to application in foods. Lecture 8. Development and characterizaction of fiber-enriched foods. Lecture 9. Quality criteria and regulation applied to fiber-enriched foods.	lecture
2.	Laboratory. Study of the effects of dietary fiber on the rheological properties, efficiency and quality of fortified food. Laboratory. Study of the effect of fiber on the shelf life of food products. Laboratory. Determination of various fractions of dietary fiber in food.	laboratory classes

Course advanced

Teaching methods:

classes, lecture, discussion, teamwork

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	60%
laboratory classes	written credit, observation of student’s work, report	40%

Entry requirements

General food technology

Literature

Obligatory

1. Prosky L., McCleary B.V. 2001. Advanced Dietary Fibre Technology. Blackwell Science.
2. Rana, V., Bachheti, R.K., Chand, T. and Barman, A. 2011. Dietary fibre and human health, Int. J. Food Safety, Nutrition and Public Health, Vol. 4, Nos. 2/3/4, pp.101–118.
3. Spiller G.A. 2001. Dietary fiber in human nutrition, C R C Handbook, 3ed, CRC Press LLC.

Optional

1. Căpriţă A., Căpriţă R., Simulescu V. O. G., Drehe R. M. 2010. Dietary Fiber: Chemical and Functional Properties. Journal of Agroalimentary Processes and Technologies. 16(4), 406-416.
2. Dhingra, D., Michael, M., Rajput, H. et al. 2012. Dietary fibre in foods: a review. J Food Sci Technol 49, 255–266. https://doi.org/10.1007/s13197-011-0365-5
3. Hussain S., Jõudu I., Bhat R. 2020. Dietary Fiber from Underutilized Plant Resources—A Positive Approach for Valorization of Fruit and Vegetable Wastes. Sustainability, 12, 5401; doi:10.3390/su12135401.
4. Ötles S., Ozgoz S., 2014. Health eff ects of dietary fi ber. Acta Sci. Pol., Technol. Aliment. 13(2), 191-202.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Quality and nutritional value of food products enriched with dietary fiber

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3246.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** No **Subject shaping practical skills** No

Teacher responsible for the subject	Radosław Spychaj
Other teachers conducting classes	Radosław Spychaj

Period Semester 2	**Examination** graded credit **Activities and hours** lecture: 20 laboratory classes: 10	**Number of ECTS points** 3.0

Goals

C1	Participation in the course allows you to obtain knowledge related to the meaning of dietary fiber, its different types and its composition, health benefits that are associated with the consumption of fiber-rich foods and influence on the quality of enriched products. This course strives for is to establish the scientific basis for the development of foods fortified with dietary fiber.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	knows in depth the unit operations of technological processes as well as development trends used in production of food enriched in dietary fiber to provide scientific and technical advice to producers and consumers	NT_P7S_WG01	written credit, observation of student's work, report
W2	know the tools for scientific and legal information searches in high fiber-food technology	NT_P7S_WK06	written credit, observation of student's work, report
W3	understand and incorporate scientific advances in high-fibre food production and preparation that enable improving its quality and functionality.	NT_P7S_WG04	written credit, observation of student's work, report
Skills – Student can:			
U1	know the tools for scientific and legal information searches in high fibre-food technology.	NT_P7S_UW01	written credit, observation of student's work, report
U2	create procedures for incorporating dietary fiber preparations into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers.	NT_P7S_UW04	written credit, observation of student's work, report
Social competences – Student is ready to:			
K1	capacity for innovation and creativity in the high fibre-food field	NT_P7S_KOR3	written credit, observation of student's work, report

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
consultations	2
exam participation	3
presentation/report preparation	10
lesson preparation	5
exam / credit preparation	40

Student workload	**Hours** 90	**ECTS** 3.0
Workload involving teacher	**Hours** 35	**ECTS** 1.2

Practical workload	Hours 10	ECTS 0.4

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Laboratory. Study of the effects of dietary fiber on the rheological properties, efficiency and quality of fortified food. Laboratory. Study of the effect of fiber on the shelf life and nutritional value of food products. Laboratory. Determination of various fractions of dietary fiber in food.	laboratory classes
2.	Lecture 1. Definition, classification and composition of dietary fiber. Lecture 2. Determination methods of dietary fiber in foods. Lecture 3. Physiological and metabolic effects of dietary fiber 1. Lecture 4. Physiological and metabolic effects of dietary fiber 2. Lecture 5. Dietary Fiber in the prevention and treatment of disease. Lecture 6. Sources of dietary fiber to application in foods. Lecture 7. Technofunctional properties of dietary fibers to application in foods. Lecture 8. Development and characterizaction of fiber-enriched foods. Lecture 9. Quality criteria and regulation applied to fiber-enriched foods.	lecture

Course advanced

Teaching methods:

classes, lecture, discussion, teamwork

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	60%
laboratory classes	written credit, observation of student’s work, report	40%

Entry requirements

General food technology

Literature

Obligatory

1. Prosky L., McCleary B.V. 2001. Advanced Dietary Fibre Technology. Blackwell Science.
2. Rana, V., Bachheti, R.K., Chand, T. and Barman, A. 2011. Dietary fibre and human health, Int. J. Food Safety, Nutrition and Public Health, Vol. 4, Nos. 2/3/4, pp.101–118.
3. Spiller G.A. 2001. Dietary fiber in human nutrition, C R C Handbook, 3ed, CRC Press LLC.

Optional

1. Căpriţă A., Căpriţă R., Simulescu V. O. G., Drehe R. M. 2010. Dietary Fiber: Chemical and Functional Properties. Journal of Agroalimentary Processes and Technologies. 16(4), 406-416.
2. Dhingra, D., Michael, M., Rajput, H. et al. 2012. Dietary fibre in foods: a review. J Food Sci Technol 49, 255–266. https://doi.org/10.1007/s13197-011-0365-5
3. Hussain S., Jõudu I., Bhat R. 2020. Dietary Fiber from Underutilized Plant Resources—A Positive Approach for Valorization of Fruit and Vegetable Wastes. Sustainability, 12, 5401; doi:10.3390/su12135401.
4. Ötles S., Ozgoz S., 2014. Health eff ects of dietary fi ber. Acta Sci. Pol., Technol. Aliment. 13(2), 191-202.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Final project - Food quality and functionality research

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI2BO.3283.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Salejda, Małgorzata Korzeniowska
Other teachers conducting classes	Anna Salejda, Małgorzata Korzeniowska, Maciej Oziembłowski, Marek Szołtysik, Agnieszka Nemś, Joanna Miedzianka, Joanna Kolniak-Ostek, Antoni Szumny, Maria José Argente Carrascosa

Period Semester 2	**Examination** graded credit **Activities and hours** lecture: 30 project classes/workshop: 120	**Number of ECTS points** 12.0

Goals

C1	planning the structure of research project related to food quality
C2	constructing the project proposal
C3	formulating the objectives and hypothesis of the study, materials and methodology
C4	carrying out the project
C5	calculate and present the results

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality.	NT_P7S_WG04	project, report
W2	contrast and interpret advances in agro-food biotechnology and their practical applications.	NT_P7S_WG02	project, report
W3	categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies	NT_P7S_WG03	project, report
Skills – Student can:			
U1	plan research projects related to food quality and safety in agro-food technology	NT_P7S_UO06	project
U2	formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UW03	project
U3	create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers.	NT_P7S_UW04	project
U4	use tools to search for relevant and reliable information to resolve problems, develop strategies, and advise agro-food industries.	NT_P7S_UW01	project
U5	the student is able to use professional terminology in a foreign language	NT_P7S_UK07	project, report
Social competences – Student is ready to:			
K1	critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality.	NT_P7S_KK01	project, report
K2	capacity for innovation and creativity in the agro-food field.	NT_P7S_KOR3	project, report

Balance of ECTS points

Activity form	Activity hours*

lecture	30
project classes/workshop	120
presentation/report preparation	40
project preparation	60
literature study	10
conducting research	90
consultations	2

Student workload	**Hours** 352	**ECTS** 12.0
Workload involving teacher	**Hours** 152	**ECTS** 6.0
Practical workload	**Hours** 210	**ECTS** 8.0

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Choice of the subject matter of the project in the area of food quality Plan and structure the project Development of the project Presentation of the project	lecture
2.	Choice of the subject matter of the project Plan and structure the project Development of the project (carrying out) Preparation of the project results Presentation and defense of the project	project classes/workshop

Course advanced

Teaching methods:

participation in research, discussion, presentation / demonstration, project-based learning (PBL), problem-solving method, brainstorming, text analysis, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	report	30%
project classes/workshop	project	70%

Entry requirements

food technology

food quality
food chemisty

Literature

Obligatory

1. Recent articles from academic journals related to the subject matter of the project, e.g. Journal of Food Sciences, Food chemistry, Foods etc.

Optional

1. Egbuna, Chukwuebuka., Genevieve. Dable-Tupas, and Springer. Wydawca. Functional Foods and Nutraceuticals : Bioactive Components, Formulations and Innovations. Cham: Springer, 2020. Print.
2. http://www.fao.org/fao-who-codexalimentarius/en/
3. https://www.fda.gov/food/food-ingredients-packaging/generally-recognized-safe-gras
4. https://eur-lex.europa.eu/homepage.html

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Final project - Innovation and development of food quality and safety

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI2BO.3284.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** optional
Study form Full-time	**Block** major subjects (conducted) in foreign languages
Education profile General academic	**Subject related to scientific research** Yes
	Subject shaping practical skills Yes

Teacher responsible for the subject	Małgorzata Korzeniowska, Agnieszka Kita, Anna Dąbrowska, Anna Michalska
Other teachers conducting classes	Małgorzata Korzeniowska, Agnieszka Kita, Anna Dąbrowska, Anna Michalska, Maria José Argente Carrascosa, Sendrá Nadal

Period Semester 2	**Examination** graded credit **Activities and hours** lecture: 30 project classes/workshop: 120	**Number of ECTS points** 12.0

Goals

C1	planning the structure of food research project
C2	constructing the project proposal
C3	formulating the objectives and hypothesis of the study, materials and methodology
C4	carrying out the project
C5	calculate and present the results
C6	To know how to incorporate scientific advances in the field of agri-food technology that help solve problems of production, quality and functionality of food

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Integrate knowledge in food production, quality and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_WG01, NT_P7S_WG04, NT_P7S_WG05, NT_P7S_WK06	project, participation in discussion
W2	Know the tools for scientific and legal information searches in agro-food technology.	NT_P7S_WG05, NT_P7S_WK06	project, participation in discussion
W3	Categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_WG03, NT_P7S_WG04	project, participation in discussion
W4	Understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality.	NT_P7S_WG04	project, participation in discussion
Skills – Student can:			
U1	Use tools to search for relevant and reliable information to resolve problems, develop strategies, and advise agro-food industries.	NT_P7S_UW01	project, participation in discussion
U2	Develop autonomous and lifelong learning in the agro-food field.	NT_P7S_UW02	project, participation in discussion
U3	Plan research projects related to food quality and safety in agro-food technology.	NT_P7S_UO06	project, participation in discussion
U4	Formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UW03	project, participation in discussion
Social competences – Student is ready to:			
K1	Critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality.	NT_P7S_KK01	project, participation in discussion
K2	Capacity for innovation and creativity in the agro-food field.	NT_P7S_KOR3	project, participation in discussion
K3	Apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_KO02	project, participation in discussion

Balance of ECTS points

Activity form	Activity hours*
lecture	30
project classes/workshop	120
presentation/report preparation	40
project preparation	60
literature study	15
conducting research	90

Student workload	**Hours** 355	**ECTS** 12.0
Workload involving teacher	**Hours** 150	**ECTS** 6.0
Practical workload	**Hours** 210	**ECTS** 8.0

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Choice of the subject matter of the project in the area of food technology and nutrition Rules and practical aspects of the project plann and structure Phases of the project development Possible changes during carrying out the project Rules for the project presentation Presentation of the project	lecture
2.	Disscussion on the newest trends in food technology and nutrition Choice of the project subject based on the brain storming Plan and structure the project Development of the project (carrying out) Preparation of the project results Preparation of the project presentation Presentation of the project	project classes/workshop

Course advanced

Teaching methods:

participation in research, discussion, teamwork, presentation / demonstration, situation-based learning, project-based learning (PBL), problem-solving method, brainstorming, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	participation in discussion	30%
project classes/workshop	project	70%

Entry requirements

Food technology, food chemistry, biochemistry, physics, engineering

Literature

Obligatory

1. Journal of Food Science
2. Food Engineering
3. Food Chemistry

Optional

1. FAO/WHO site
2. Eur-Lex publications

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Advanced in animal well-being and food safety in raw materials

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3248.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** No **Subject shaping practical skills** Yes

Teacher responsible for the subject	Małgorzata Korzeniowska
Other teachers conducting classes	Małgorzata Korzeniowska, Marek Szołtysik, Anna Salejda

Period	**Examination**	**Number of ECTS points**
Semester 3	exam **Activities and hours** lecture: 30 laboratory classes: 15	4.5

Goals

C1	Knowing the role of animal welfare in the quality and safety of foods and analyze the factors that influence it
C2	Know the Spanish and Polish as well as European food safety and animal welfare law in force
C3	Know how to manage livestock production by complying with the requirements established in the current regulations on food safety and animal welfare.
C4	Describe the methods of evaluation and control of animal welfare and food safety and to Know the protocol of action in the diagnosis and alerts generated for reasons of food safety

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_WG01, NT_P7S_WK06	written exam
W2	Assess indicators of biotic and abiotic contamination, and the factors that affect them in improving food safety of animal products	NT_P7S_WG01, NT_P7S_WG04, NT_P7S_WK06	written exam
W3	Understand and apply scientific advances in animal production to be used in R&D of animal production industries.	NT_P7S_WG01, NT_P7S_WG05	written exam
Skills – Student can:			
U1	Develop and produce reports and procedures to manage food quality and safety based on continuous improvement.	NT_P7S_UW02, NT_P7S_UW03, NT_P7S_UW04	active participation
U2	Develop autonomous and lifelong learning in the agro-food field.	NT_P7S_UK08, NT_P7S_UW01	active participation
U3	Plan research projects related to food quality and safety in agro-food technology.	NT_P7S_UO06	active participation
U4	Formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UO06, NT_P7S_UW01, NT_P7S_UW03	active participation, presentation
Social competences – Student is ready to:			
K1	Critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality.	NT_P7S_KK01	active participation
K2	Capacity for innovation and creativity in the agro-food field.	NT_P7S_KOR3	active participation
K3	Apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_KO02	active participation

Balance of ECTS points

Activity form	Activity hours*

lecture	30
laboratory classes	15
consultations	25
lesson preparation	48

Student workload	**Hours** 118	**ECTS** 4.5
Workload involving teacher	**Hours** 70	**ECTS** 2.6
Practical workload	**Hours** 15	**ECTS** 0.6

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	The role of livestock in food safety and security Risk factors in primary production Risk factors and mitigation plans in animal food processing Legislation in force Control mechanisms in production and processing Strategies for microbiological risks minimization	lecture
2.	Visit to Agency for Consumer Affairs, Food Safety and Nutrition Series of visits in meat, milk or fish industry plants Collection of information, preparation of a report, exhibition and debate on two current topics related to the food safety of foods of animal origin.	laboratory classes

Course advanced

Teaching methods:

discussion, brainstorming, lecture, problem-solving method, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	50%
laboratory classes	active participation, presentation	50%

Entry requirements

basic and food chemistry, food analysis, animal food products safety, food law

Literature

Obligatory

1. Food security in the European Union
2. Codex Alimentarius
3. Food safety, microbiological and toxicological journals

Optional

1. EurLex publisher
2. Food safety and quality

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Advanced methodologies in food quality and safety

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3247.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** No **Subject shaping practical skills** No

Teacher responsible for the subject	Marek Szołtysik
Other teachers conducting classes	Marek Szołtysik, Pedro J Zapata Coll

Period Semester 3	**Examination** graded credit **Activities and hours** lecture: 30 laboratory classes: 15	**Number of ECTS points** 4.5

Goals

C1	For many companies, the best-known standards of food quality and safety are a step further in the fight for achieving total quality. Improving the agro-food industry in these terms depends largely upon the proximity of companies to R&D on quality and safety. This course covers the knowledge for evaluating risks from foods using advanced analytical tools and methodologies for monitoring food quality and safety. With this expertise, the student becomes capable of evaluating with advanced tools the influence of ingredients, processes, packaging, and other aspects of food production upon the quality and safety of foods.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the current problems related to the food quality and safety and the emergent risks derivent from them.	NT_P7S_WG05	written credit
W2	the basis of the analytical techniques developed to control quality and food safety; methodologies of risk assessment, highlighting those that allow improving the risk assessment process in food.	NT_P7S_WK06	written credit
W3	the importance of selecting the right ingredients to achieve a better quality and safety in food.	NT_P7S_WG04	written credit
W4	the standards for food quality and safety certification; know how to implement quality management and food safety systems in the agri-food industry.	NT_P7S_WK06	written credit
Skills – Student can:			
U1	develop and produce reports and procedures to manage food quality and safety based on continuous improvement.	NT_P7S_UW02	project
Social competences – Student is ready to:			
K1	innovation and creativity in the agro-food field.	NT_P7S_KOR3	written credit, project
K2	apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_KO02	project

Balance of ECTS points

Activity form	Activity hours*
lecture	30
laboratory classes	15
project preparation	50
consultations	5
presentation/report preparation	20

Student workload	**Hours** 120	**ECTS** 4.5
Workload involving teacher	**Hours** 50	**ECTS** 2.0
Practical workload	**Hours** 15	**ECTS** 0.6

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Food safety in concept of consumers and supervising units. Food safety insurance law regulations. Characteristics of basics hygienic regulations of food stuffs according to Codex Alimentarius. Health hazards - traceability, and disposition of nonconforming product in food production chain. The characteristics of Rapid Alert System for Food and Feed (RASFF). Methods for risk estimation and analysis systems (obligatory) GMP/GHP, HACCP, and facultative (ISO 22000, BRC, IFS). Procedure Food Defence acc. to PAS 96:2014.	lecture
2.	Designing the HACCP system and GMP/GHP standards for selected branch of food industry. Designing the traceability procedure for selected branch of food industry, nonconforming product and it's withdrawall from market. Methods of risk estimation and analysis in developing the food.	laboratory classes

Course advanced

Teaching methods:

lecture, discussion, teamwork, project-based learning (PBL), case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
laboratory classes	project	50%

Entry requirements

Basic knowledge about food technology, microbiology and food toxicology

Literature

Obligatory

1. Kotzekidou, Parthena, editor. "Food hygiene and toxicology in ready to eat foods /".
2. Arvanitoyannis S. I., 2009: HACCP and ISO 22000, Application to food of animal origin. Wiley-Blackwell, New Delhi, India

Optional

1. Bevilacqua, Antonio./Corbo, Maria Rosaria./Sinigaglia, Milena. "Application of alternative food-preservation technologies to enhance food safety and stability [electronic resource] /". [S.l.] : Bentham e Books, [2010].
2. Vergnaud, J. M. Rosca, Iosif-Daniel. "Assessing food safety of polymer packaging [electronic resource] /". Shrewsbury, Shropshire : Rapra Technology, 2006.
3. Thompson, Terrence P. "Chemical safety of drinking-water [electronic resource] : assessing priorities for risk assessment /". Geneva : World Health Organization, c2007.
4. Links https://www.efsa.europa.eu/en https://www.aesan.gob.es/AECOSAN/web/home/aecosan_inicio.htm https://efsa.onlinelibrary.wiley.com/journal/18314732

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Biosustainability and assesment of food industry co-products

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3249.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** No **Subject shaping practical skills** No

Teacher responsible for the subject	Andrzej Białowiec
Other teachers conducting classes	Andrzej Białowiec

Period	**Examination**	**Number of ECTS points**
Semester 3	graded credit **Activities and hours** lecture: 10 project classes/workshop: 20	3.0

Goals

C1	The aim of the course is to present methods, and techniques of food industry by-products management, and treatment with a special focus on closing the loop, recycling, and recovery of valuable products as an implementation of bioeconomy and sustainability principles in the food production sector.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	The student knows the principles of bioeconomy and sustainability in the food industry	NT_P7S_WG02	written credit
W2	The student knows the food waste by-products management and treatments methods and techniques	NT_P7S_WG05	written credit
Skills – Student can:			
U1	The student can propose strategies on the food industry by-products mangement and treatment	NT_P7S_UW01	project
U2	The student can evaluate the feasibility of food industry by-products management and treatment technologies	NT_P7S_UW05	project
U3	The student can develop and use innovative tools for assessing the value of food industry by-products	NT_P7S_UW05	project
U4	The student can use professional terminology, definition, and vocabulary in a foreign language	NT_P7S_UK07	project, presentation
Social competences – Student is ready to:			
K1	The student has critical and self-critical capacity to assess, contrast, and decide upon scientific advances in bioeconomy and sustainability of food industry	NT_P7S_KK01	project, presentation

Balance of ECTS points

Activity form	Activity hours*
lecture	10
project classes/workshop	20
project preparation	20
collecting and studying literature	20
exam participation	1
exam / credit preparation	2
presentation/report preparation	10

Student workload	**Hours** 83	**ECTS** 3.0
Workload involving teacher	**Hours** 31	**ECTS** 1.0
Practical workload	**Hours** 20	**ECTS** 0.8

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Principles of sustainable development in the food industry New trends, strategies, and policies in environmental aspects of food production Composition and properties of by-products from the food industry Technologies for management and treatment of food industry by-products Innovations in the management and treatment of food industry by-products Biorefineries	lecture
2.	Problem-based classes in the field of developing a new product derived from food industry by-products in accordance with the idea of bioeconomy and sustainability, taking into account the environmental safety aspect of the newly introduced product - Problem-Based Learning	project classes/workshop

Course advanced

Teaching methods:

classes, lecture, brainstorming, project-based learning (PBL), presentation / demonstration

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
project classes/workshop	project, presentation	50%

Entry requirements

microbiology, enzymology

Literature

Obligatory

1. https://doi.org/10.1016/j.envdev.2015.03.006
2. https://doi.org/10.3390/su8070691
3. https://doi.org/10.1016/j.nbt.2017.06.010
4. https://doi.org/10.1016/j.nbt.2017.04.002

Optional

1. https://doi.org/10.1016/j.nbt.2017.04.004
2. https://doi.org/10.1016/j.nbt.2017.06.005

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Development and new packing technologies

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3250.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Zimoch-Korzycka
Other teachers conducting classes	Anna Zimoch-Korzycka, Pedro J Zapata Coll

Period	**Examination**	**Number of ECTS points**
Semester 3	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	The aim of the course is to provide, verify and consolidate the latest knowledge and skills and the acquisition of social competences in the field of new and innovative food packaging techniques about their way of preservative action, effectiveness and suitability in various types of foods.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.	NT_P7S_WG01	written credit, active participation, report, presentation, test
W2	categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_WG03	written credit, report, test
W3	understand and incorporate scientific advances in food production and preparation that enable improving its quality and functionality.	NT_P7S_WG04	observation of student’s work, report, presentation
W4	know the tools for scientific and legal information searches in agro-food technology.	NT_P7S_WK06	written credit, active participation, test
Skills – Student can:			
U1	formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UW03	written credit, report, test
U2	plan research projects related to food quality and safety in agro-food technology.	NT_P7S_UO06	written credit, report, presentation, test
U3	develop and use tools to assess co-products in the food industry.	NT_P7S_UW05	observation of student’s work, report
U4	categorize the main deterioration indices of food and use them to adapt packaging and conservation technology following agro-food marketing strategies.	NT_P7S_UW03	active participation, presentation, test
Social competences – Student is ready to:			
K1	capacity for innovation and creativity in the food packaging technology.	NT_P7S_KOR3	written credit, active participation, report, presentation
K2	apply knowledge acquired and form judgments that include reflection on social and ethical responsibilities in the food packaging.	NT_P7S_KO02	written credit, active participation, report, presentation

Balance of ECTS points

Activity form	Activity hours*
lecture	20
laboratory classes	10
exam / credit preparation	30
exam participation	1
presentation/report preparation	15

consultations	4

Student workload	**Hours** 80	**ECTS** 3.0
Workload involving teacher	**Hours** 35	**ECTS** 1.2
Practical workload	**Hours** 10	**ECTS** 0.4

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Basic function of packaging. 2. Food shelf life. 3. Modified Atmosphere Packaging. 4. Intelligent food packaging. 5. Active food packaging. 6. Nanotechnologies in food packaging. 7. New materials for food packaging. 8. Food safety issues. 9. Environmental issues (biosourced, biodegradable, recyclable). 10. Future trends.	lecture
2.	1. Obtaining and calculating modified atmospheres to pack fresh food. 2. Comperative study of vacuum and modified atmosphere packaging. 3. Microbiology analysis of packed fresh food with different technologies. 4. Project of new packaging. 5. Credit - test.	laboratory classes

Course advanced

Teaching methods:

presentation / demonstration, classes, lecture, teamwork, problem-solving method

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%

Activities	Examination methods	Percentage in subject assessment
laboratory classes	observation of student’s work, active participation, report, presentation, test	50%

Entry requirements

General food microbiology,
Mechanics science of food industry,
General and food microbiology,
Food storage,
Food hygiene and toxicology

Literature

Obligatory

1. Food packaging: principles and practice, Robertson G.L., Marcel Dekker Inc.,2013.
2. Bio-based Materials for Food Packaging. Green and Sustainable Advanced Packaging Materials. Shakeel A. Springer Nature Singapore Pte Ltd., 2018.
3. Food packaging technology. Coles R., McDwell D., Kirwan M.J., Blackwell Publishing, CRC Press, 2003.

Optional

1. https://pakfactory.com
2. https://www.packagingdigest.com/food-packaging
3. https://www.foodpackagingforum.org

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Innovation in processed and minimaly proceessed plant-based foods

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3230.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Michalska, Paulina Nowicka
Other teachers conducting classes	Anna Michalska, Paulina Nowicka, Pedro J Zapata Coll

Period Semester 3	**Examination** graded credit **Activities and hours** lecture: 30 laboratory classes: 15	**Number of ECTS points** 4.5

Goals

C1	Provide a knowledge about latest advances in the production and preservation of plants, mainly fruit and vegetables
C2	Present the food classification systems
C3	Provide a knowledge about fundamentals of the industry handling minimally processed products
C4	Aware the students about the indicators for evaluation of minimally processed products

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	to acquire the knowledge about food classification systems	NT_P7S_WG01, NT_P7S_WG02, NT_P7S_WG03	written credit
W2	to gain knowledge about new technologies or new applications of traditional technologies to preserve the quality of agri-food products	NT_P7S_WG04, NT_P7S_WG05, NT_P7S_WK06	written credit, participation in discussion
W3	to gain knowledge about leading preservation factors for minimally processed foods	NT_P7S_WG04, NT_P7S_WK07	written credit
Skills – Student can:			
U1	know the principles of the metabolism and the physiology of the horticultural products	NT_P7S_UK08, NT_P7S_UW03	report
U2	know the tools for obtainment of minimally-processed foods	NT_P7S_UW03, NT_P7S_UW04, NT_P7S_UW05	observation of student’s work, performing tasks
U3	has the ability to adjust the technique used for preservation of minimally processed products	NT_P7S_UW03, NT_P7S_UW04	observation of student’s work
U4	know the latest technological advances and research related to minially processed foods	NT_P7S_UW02	report, participation in discussion
U5	has an ability to use a specific terminology in English	NT_P7S_UK07	written credit, observation of student’s work, report, participation in discussion, performing tasks
Social competences – Student is ready to:			
K1	able to classify food in terms of processing	NT_P7S_KK01	written credit, performing tasks
K2	able to propose newest solution for preservation of particular minimally processed foods	NT_P7S_KO02	written credit
K3	able to apply different solution for preparation of minimally processed food	NT_P7S_KOR3	written credit

Balance of ECTS points

Activity form	Activity hours*
lecture	30
laboratory classes	15
consultations	5
lesson preparation	10
collecting and studying literature	10
report preparation	50

Student workload	**Hours** 120	**ECTS** 4.5
Workload involving teacher	**Hours** 50	**ECTS** 2.0
Practical workload	**Hours** 65	**ECTS** 2.3

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	(1) Characterisation of horticultural products (2) Characterisation of food classification systems (3) Latest advances in the production and fresh preservation of fruits and vegetables (4) New techniques and solutions used for minimally-processed foods preservation	lecture
2.	(1) Indicators of minimally processed foods (2) Evaluation of the quality of minimally processed foods (3) Novel solution for minimally-processed horticultural products	laboratory classes

Course advanced

Teaching methods:

blended learning, blended learning, classes, lecture, discussion, teamwork, presentation / demonstration, problem-solving method

Activities	Examination methods	Percentage in subject assessment
lecture	written credit, participation in discussion	50%
laboratory classes	observation of student’s work, report, performing tasks	50%

Literature

Obligatory

1. S.M. Alzamora, A. López-Malo, M.S. Tapia, J. Welti-Chanes (2016) Minimally Processed Foods, Editor(s): Benjamin Caballero, Paul M. Finglas, Fidel Toldrá, Encyclopedia of Food and Health, Academic Press, Pages 767-771, ISBN 9780123849533, https://doi.org/10.1016/B978-0-12-384947-2.00470-0
2. E. Ortega-Rivas (2014) Non-thermal processing - Steam Vacuuming, Editor(s): Carl A. Batt, Mary Lou Tortorello, Encyclopedia of Food Microbiology (Second Edition), Academic Press, ISBN 9780123847331, https://doi.org/10.1016/B978-0-12-384730-0.00403-1.
3. Robert W. Lencki, (2014) Chapter 33 - Modified Atmosphere Packaging, for Minimally Processed Foods, Editor(s): Da-Wen Sun, Emerging Technologies for Food Processing (Second Edition), Academic Press, ISBN 9780124114791, https://doi.org/10.1016/B978-0-12-411479-1.00033-4.

Optional

1. D. Knorr, M.A. Augustin, (2021) Food processing needs, advantages and misconceptions, Trends in Food Science & Technology, 108, 103-110, ISSN 0924-2244, https://doi.org/10.1016/j.tifs.2020.11.026.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Market opportunity analysis and direction of agro-food marketing

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI4HS.3251.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** mandatory
Study form Full-time	**Block** humanities and social sciences
Education profile General academic	**Subject related to scientific research** Yes
	Subject shaping practical skills Yes

Teacher responsible for the subject	Magdalena Raftowicz
Other teachers conducting classes	Magdalena Raftowicz

Period	**Examination**	**Number of ECTS points**
Semester 3	graded credit **Activities and hours** lecture: 15 project classes/workshop: 15	3.0

Goals

C1	The main objective of the course is to familiarize students with theoretical and practical knowledge of the agro-food market and marketing.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	The graduate knows and understands the marketing strategies of agricultural and food products.	NT_P7S_WG03	written credit
Skills – Student can:			
U1	The graduate is able to analyse the market potential in terms of consumer acceptance.	NT_P7S_UW04	project, presentation
U2	The graduate is able to use tools to search for relevant and reliable information in order to solve problems, develop strategies and consultancy for the agri-food industry.	NT_P7S_UW01	project, presentation
Social competences – Student is ready to:			
K1	The graduate is ready to critically and self-critically assess, analyze and decide on scientific progress in the field of agri-food technology and quality.	NT_P7S_KK01	project, presentation
K2	The graduate is ready to use the potential of innovation and creativity in the field of agri-food to improve the quality of life of society.	NT_P7S_KOR3	project, presentation

Balance of ECTS points

Activity form	Activity hours*
lecture	15
project classes/workshop	15
lesson preparation	15
project preparation	25
consultations	2
exam / credit preparation	10

Student workload	**Hours** 82	**ECTS** 3.0
Workload involving teacher	**Hours** 32	**ECTS** 1.1
Practical workload	**Hours** 15	**ECTS** 0.6

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Introduction to the agro-food market (1h) 2. SWOT and PESTLE analysis (2h) 3. Introduction to the theory of marketing. The evolution of marketing (2h) 4. Market segmentation. Marketing research (2h) 5. Marketing mix: Product, Price, Distribution, Promotion (2h) 6. Territorial marketing. Marketing of regional and traditional products. 7. International Marketing (2h) 8. Test (2h)	lecture
2.	1. Discussion of the work plan during the exercises (1h) 2. Business plan. Project description. Setting strategic goals - work in groups (2h) 3. Market analysis: customers, suppliers, competitors - work in groups (2h) 4. Financial plan - work in groups (2h) 5. Developing a business plan: marketing activities - group work (2h) 6. Presentation of a business plan developed by students, questions, discussion (2h) 7. Presentation of a business plan developed by students, questions, discussion (2h) 8. Presentation of a business plan developed by students, questions, discussion (2h)	project classes/workshop

Course advanced

Teaching methods:

problem-based learning (PBL), tutoring, educational film, classes, lecture, teamwork, problem-solving method, case analysis, text analysis, brainstorming, project-based learning (PBL), discussion

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
project classes/workshop	project, presentation	50%

Literature

Obligatory

1. Ph. Korler, Principles of Marketing, Pearson, 2020,
2. R. Chand, Agriculture marketing, 2011,

Optional

1. K. Williams, Brilliant Business Plan: What to Know & Do to Make the Perfect Plan, Prentice Hall, 2010;

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Planning and preparation of scientific papers

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4HS.3232.24 **Lecture languages** english **Mandatory** mandatory **Block** humanities and social sciences **Subject related to scientific research** No **Subject shaping practical skills** Yes

Teacher responsible for the subject	Anna Michalska
Other teachers conducting classes	Anna Michalska, Salvador Castillo García

Period	**Examination**	**Number of ECTS points**
Semester 3	graded credit **Activities and hours** lecture: 20 laboratory classes: 10	3.0

Goals

C1	Provide a knowledge about bibliometrics indexes and leading publishers
C2	Provide an information about databases of scientific publications
C3	Provide a knowledge about preparation of the scientific manuscript and review article in a particular scientific journal
C4	Aware the students about the submission systems and requirements in dependence of the publisher
C5	Provide a knowledge about evaluation process of scientific manuscripts

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	acquire the knowledge about bibliometrics indexes and the leading publishers	NT_P7S_WK06	presentation
W2	know how to prepare a scientific manuscript in particular journal	NT_P7S_WG01	presentation
W3	know the types of open access publishing possibilities	NT_P7S_WK06, NT_P7S_WK07	active participation
W4	know how to submit manuscript to a particular journal and how to prepare cover letter	NT_P7S_WG02, NT_P7S_WG04, NT_P7S_WK06, NT_P7S_WK07	active participation
W5	gain knowledge about the evaluation or revision of a research paper	NT_P7S_WK06, NT_P7S_WK07	presentation
W6	is familiarize with the editor and reviewer’s role	NT_P7S_WK07	performing tasks
Skills – Student can:			
U1	has the ability to prepare scientific manuscript for a particular journal in dependence of the publisher requirements for manuscript preparation	NT_P7S_UK07, NT_P7S_UW01, NT_P7S_UW02	active participation
U2	has the ability to construct the scientific manuscript, review article, congress paper and book chapter for agri-food research	NT_P7S_UW01, NT_P7S_UW02, NT_P7S_UW03, NT_P7S_UW05	active participation
U3	has ability to submit the manuscript for the review process	NT_P7S_UO06, NT_P7S_UW01	active participation
U4	has the ability to respond to the editor and reviewer’s comments	NT_P7S_UW05	active participation
U5	has an ability to use a specific terminology in English	NT_P7S_UK07	active participation, report, presentation, performing tasks
Social competences – Student is ready to:			
K1	Able to plan and prepare a manuscript for publishing in scientific journal, book chapter, conference proceedings	NT_P7S_KO02, NT_P7S_KOR3	report

K2	Able to choose the publisher and journal for a special purpose of the studies	NT_P7S_KK01	active participation
K3	Able to submit the manuscript for evaluation and respond to the reviewers	NT_P7S_KK01	performing tasks

Balance of ECTS points

Activity form	**Activity hours***
lecture	20
laboratory classes	10
presentation/report preparation	20
consultations	25

Student workload	**Hours** 75	**ECTS** 3.0
Workload involving teacher	**Hours** 55	**ECTS** 2.0
Practical workload	**Hours** 10	**ECTS** 0.4

* hour means 45 minutes

Study content

No.	**Course content**	**Activities**
1.	(1) Description of the main bibliometric indicators (2) Characterisation of leading publishers (3) Description of the general rules for preparation of scientific articles (4) Preparation of individual parts of scientific article, i.e., abstract, introduction, hypotheses, results and discussion, conclusions (5) Scientific papers and review articles (6) Cover letter – form, style (7) Description of on-line systems for submission of manuscripts (8) Review process of scientific articles	lecture
2.	(1) preparation of an abstract (2) review of the abstract (3) preparation of cover letter	laboratory classes

Course advanced

Teaching methods:

blended learning, blended learning, text analysis, lecture, discussion, presentation / demonstration, problem-solving method, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	active participation	30%
laboratory classes	report, presentation, performing tasks	70%

Literature

Obligatory

1. Gewin, W. (2018) How to write a first-class paper. Nature, 555, 129-130.
2. J.E. Hirsch (2005) An index to quantify an individual’s scientific research output. Proceedings of the National Academy of Sciences of the United States of America (2005, 102 (46), 16569-16572.
3. S. T. A. Picket, M. J. McDonnell (2017) The art and science of writing a publishable article. Journal of Urban Ecology, 3, 1-6.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Sensory analysis as a tool for food innovation

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3233.24 **Lecture languages** english **Mandatory** mandatory **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Agnieszka Nemś
Other teachers conducting classes	Agnieszka Nemś, Pedro J Zapata Coll

Period Semester 3	**Examination** exam **Activities and hours** lecture: 30 laboratory classes: 15	**Number of ECTS points** 4.5

Goals

C1	This course will allow the student to delve into advanced and completely practical aspects of sensory analysis. Transfer of knovledge in the field of formation of descriptive panels and in the realization of consumer studies for companies in the agri-food sector as well as transfer practical and real experience with companies to the student who is beginning his career in this sector.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	The student knows and understands at an advanced level the concepts and issues related to the sensory analysis of food.	NT_P7S_WG01	written exam, test
W2	The student knows and understands what the descriptive sensory analysis tests are	NT_P7S_WG04	written exam, test
W3	The student knows and understands what the affective (consumers) studies are.	NT_P7S_WG01	written exam, test
Skills – Student can:			
U1	The student is able to develop specific lexicons for specific products and create a database of "general" reference products of wide use.	NT_P7S_UW03, NT_P7S_UW05	observation of student's work, active participation, report, test
U2	The student is able to train and "certify" panels of tasters for private companies.	NT_P7S_UK08	observation of student's work, active participation, report, test
U3	The student is able to estimate the shelf life of foods using sensory analysis.	NT_P7S_UK07	observation of student's work, active participation, report, test
U4	The student is able to design a specific affective study for a national and / or international market and determine the factors that control the acceptance of national and international consumers as well as estimate the willingness to pay of national and international consumers for a new product.	NT_P7S_UO06, NT_P7S_UW04	observation of student's work, active participation, report, test
U5	The student is able to evaluate the new techniques that arise in sensory analysis and determine its practical application.	NT_P7S_UW01	observation of student's work, active participation, report, test
Social competences – Student is ready to:			
K1	The student is ready to use the knowledge and skills in the field of sensory analysis of food in solving problems in agro-food field.	NT_P7S_KOR3	observation of student's work, active participation
K2	The student is ready to critically assess knowledge and skills as well consult with experts in the event of difficulties in solving the problem on your own.	NT_P7S_KK01	observation of student's work, active participation

Balance of ECTS points

Activity form	Activity hours*
lecture	30
laboratory classes	15
report preparation	15
exam participation	1

class preparation	30
exam / credit preparation	30
consultations	2

Student workload	**Hours** 123	**ECTS** 4.5
Workload involving teacher	**Hours** 48	**ECTS** 1.9
Practical workload	**Hours** 30	**ECTS** 1.0

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Development of sensory lexicons (development: definitions, reference products and method of preparation; spectrum method). 2. Training of quality panels in agri-food companies (control of the functioning of the panel and each panelist; motivation). 3. Training of Research and Development panels in agri-food companies (control of the operation of the panel and each panelist; motivation) 4. Evaluation of the sensory shelf-life of food. 5. Accreditation of sensory panels. 6. Advances statistics for descriptive sensory studies. 7. Organization and realization of affective studies (implementation of the results and preparation of reports: hedonic scales; JAR type questions (just about right); purchase intent; CATA questions) 8. Focus groups. 9. Willingness to pay. 10. Advanced statistics for consumer studies (PCA, PLS, preference maps, CATA data analysis, and clustering).	lecture

2.	1. Lexicon development for a specific product. 2. Development of a new product based on chocolate. 3. Certification of the sensory panel: verification of the documents and sensory tools. 4. Evaluation of different statistical computer packages for use in research on quality control studies. 5. Conducting a focus group on a specific food group. 6. Evaluation of the availability to pay in European markets for a new product: on-line study. 7. Design, execution and interpretation of an affective study for a new product. 8. Statistical computer studies for use in research on consumer studies.	laboratory classes

Course advanced

Teaching methods:

classes, lecture, computer lab/laboratory, situation-based learning, problem-solving method, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	50%
laboratory classes	observation of student’s work, active participation, report, test	50%

Entry requirements

The basic knovledge and skills of food quality assessment, sensory analysis of food and food products.

Literature

Obligatory

1. Moskowitz, H. ed. lit. Applied sensory analysis of foods volume II. Boca Raton CRC Press 1988.
2. Meilgaard, M., Civille, G., V., Carr, B. T. Sensory evaluation techniques. Boca Raton, CRC Press, 1999.
3. Piggott, J. ed. Alcoholic beverages: sensory evaluation and consumer research. Philadelphia, Pa.: Woodhead Pub., 2012.
4. Lawless, H.,T., Heymann, H. Sensory evaluation of food: principles and practices. New York : Springer, 2010.
5. Kemp, S.E., Hort, J., Hollowood T. Descriptive analysis in sensory evaluation. Wiley Backwell. 2018.

Optional

1. Kemp, S. E., Hollowood, T., Hort, J. Sensory evaluation: a practical handbook. Chichester, U.K.: Ames, Iowa: Wiley-Blackwell, 2009.
2. Stone, H., Sidel, J. L. Sensory evaluation practices. Amsterdam ; Boston: Elsevier Academic Press, 2004.
3. Delarue, J., Lawlor, B., Rogeaux M. Rapid sensory profiling techniques and related methods. Applications in new product development and consumer research. Woodhead Publishing Services. 2015

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Final master project - Food quality and functionality research

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4B.3280.24 **Lecture languages** english **Mandatory** optional **Block** major subjects **Subject related to scientific research** No **Subject shaping practical skills** No

Teacher responsible for the subject	Joanna Chmielewska
Other teachers conducting classes	Joanna Chmielewska

Period	**Examination**	**Number of ECTS points**
Semester 3	exam **Activities and hours** lecture: 30 laboratory classes: 120	12.0

Goals

C1	The aim of education is to enable students to get skills preparing for professional or scientific work in the field of food quality and functionality, with the use of advanced technical and technological processes.
C2	The aim of the course is to prepare the diploma thesis, including the development of the results obtained and their analysis and comparison with the available data in the scientific literature in consultation with the promoter. The subject is adapted individually for each student.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	interpret advances in agro-food biotechnology and their practical applications	NT_P7S_WG02	oral exam, project, report, presentation, participation in discussion, diploma paper
W2	scientific progress in the production and preparation of food, ensuring the improvement of quality in production	NT_P7S_WG03, NT_P7S_WG04	oral exam, project, report, presentation, participation in discussion, diploma paper
W3	the tools for scientific and legal information searches in agro-food technology	NT_P7S_WK06	oral exam, project, report, presentation, participation in discussion, diploma paper
W4	integrate knowledge in food production and quality to provide scientific and technical advice	NT_P7S_WG01	oral exam, project, report, presentation, participation in discussion, diploma paper
Skills – Student can:			
U1	communicate abilities with professionals also in foreign language at B2 + level of the European Training Description System and to a higher degree use a specific terminology	NT_P7S_UK07	observation of student’s work, active participation, report, presentation
U2	develop autonomous and lifelong learning in the agrofood field	NT_P7S_UK08	observation of student’s work, active participation, report, presentation
U3	plan research projects related to food quality and safety in agro-food technology	NT_P7S_UW04	observation of student’s work, active participation, report, presentation
U4	create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers	NT_P7S_UW04	observation of student’s work, active participation, report, presentation
Social competences – Student is ready to:			
K1	critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality	NT_P7S_KK01	project, observation of student’s work, presentation, participation in discussion
K2	capacity for innovation and creativity in the agro-food field	NT_P7S_KOR3	project, observation of student’s work, presentation, participation in discussion

Balance of ECTS points

Activity form	Activity hours*
lecture	30
laboratory classes	120
conducting research	30
project preparation	60
exam / credit preparation	45
consultations on diploma paper	20
collecting and studying literature	35
exam participation	2

Student workload	**Hours** 342	**ECTS** 12.0
Workload involving teacher	**Hours** 172	**ECTS** 6.0
Practical workload	**Hours** 150	**ECTS** 6.0

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Detailed program adjusted individually to each student: Choice of the subject matter of the final project in the area of food quality and functionality Plan and structure the project Development of the project Presentation of the project	lecture
2.	Detailed program adjusted individually to each student: Implementation of project assumptions - carrying out research Preparation of research results Preparation of the thesis	laboratory classes

Course advanced

Teaching methods:

lecture, project-based learning (PBL), problem-solving method, text analysis, case analysis

Activities	Examination methods	Percentage in subject assessment

Activities	Examination methods	Percentage in subject assessment
lecture	oral exam, active participation, participation in discussion, diploma paper	30%
laboratory classes	project, observation of student’s work, active participation, report, presentation, participation in discussion	70%

Literature

Obligatory

1. Scientific papers in the field of Food quality and functionality

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Final master project - Innovation and development of food quality and safety

Educational subject description sheet

Basic information

Field of study Food Technology	**Education cycle** 2024/25
Speciality -	**Subject code** ND000000NFT-AMS.MI4BO.3279.24
Department The Faculty of Biotechnology and Food Science	**Lecture languages** english
Study level Second-cycle (engineer) programme	**Mandatory** optional
Study form Full-time	**Block** major subjects (conducted) in foreign languages
Education profile General academic	**Subject related to scientific research** Yes
	Subject shaping practical skills No

Teacher responsible for the subject	Joanna Chmielewska
Other teachers conducting classes	Joanna Chmielewska, Maria José Argente Carrascosa

Period Semester 3	**Examination** exam **Activities and hours** lecture: 30 laboratory classes: 120	**Number of ECTS points** 12.0

Goals

C1	The aim of education is to enable students to get skills preparing for professional or scientific work in the field of food production, including food product design, quality assessment and food safety, the use of advanced technological processes.
C2	The aim of the course is to prepare the diploma thesis, including the development of the results obtained and their analysis and comparison with the available data in the scientific literature in consultation with the promoter. The subject is adapted individually for each student.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	integrate knowledge in food production and technology	NT_P7S_WG01	oral exam, project, active participation, report, participation in discussion, diploma paper
W2	advances in agro-food biotechnology and their practical applications	NT_P7S_WG02	oral exam, project, participation in discussion, diploma paper
W3	scientific advances in food production and preparation	NT_P7S_WG03, NT_P7S_WG04	project, report, presentation, participation in discussion, diploma paper
W4	currently discussed problems in the scientific literature in the field food technology, food quality management systems and issues related to food commodity science	NT_P7S_WK06	project, participation in discussion, diploma paper
Skills – Student can:			
U1	communication abilities with professionals also in foreign language	NT_P7S_UK07	active participation, presentation
U2	develop autonomous and lifelong learning	NT_P7S_UK08	observation of student’s work, active participation, presentation
U3	use tools to search for relevant and reliable information to resolve problems	NT_P7S_UW01	project, active participation, report, presentation, diploma paper
Social competences – Student is ready to:			
K1	critical capacity to assess scientific advances in food technology and quality	NT_P7S_KK01	oral exam, observation of student’s work, active participation, presentation, participation in discussion, diploma paper

K2	capacity for innovation and creativity in the food technology	NT_P7S_KOR3	oral exam, observation of student’s work, active participation, presentation, diploma paper

Balance of ECTS points

Activity form	Activity hours*
lecture	30
laboratory classes	120
conducting research	90
presentation/report preparation	18
exam / credit preparation	35
consultations on diploma paper	15
collecting and studying literature	30
exam participation	2

Student workload	**Hours** 340	**ECTS** 12.0
Workload involving teacher	**Hours** 167	**ECTS** 6.0
Practical workload	**Hours** 210	**ECTS** 8.0

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Detailed program adjusted individually to each student: Choice of the subject matter of the final project in the area of food technology Plan and structure the project Development of the project Presentation of the project	lecture
2.	Detailed program adjusted individually to each student: Implementation of project assumptions - carrying out research Preparation of research results Preparation of the thesis	laboratory classes

Course advanced

Teaching methods:

discussion, project-based learning (PBL), problem-solving method, text analysis, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	oral exam, active participation, participation in discussion, diploma paper	30%
laboratory classes	project, observation of student’s work, active participation, report, presentation, participation in discussion	70%

Entry requirements

Inorganic and organic chemistry, Biochemistry, Food chemistry, General and food microbiology, Food analysis, selected food technologies

Literature

Obligatory

1. Specialized scientific literature in the field of realized thesis, e.g. Journal of Food Science, Food Engineering, Food Chemistry

Optional

1. FAO/WHO site
2. Eur-Lex publications

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Challenges and innovations in foods of animal-origin

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3255.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Salejda
Other teachers conducting classes	Anna Salejda, Anna Dąbrowska, Małgorzata Korzeniowska

Period Semester 3	**Examination** graded credit **Activities and hours** lecture: 20 project classes/workshop: 10	**Number of ECTS points** 3.0

Goals

C1	The students will learn about the latest scientific advances in products of animal origin.
C2	The students will learn about latest trends and perspectives for the future for foods of animal orgin that tend to satisfy and adapt to consumer needs.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	The student knows, understands and incorporates scientific advances in animal based foods that enable improving its quality and functionality.	NT_P7S_WG04	written credit, project
W2	The student understands and applies scientific advances in animal based foods production to be used in R&D.	NT_P7S_WG05	written credit, project
Skills – Student can:			
U1	The student is able to use tools to search for relevant and reliable information to resolve problems, develop strategies, and advise agro-food industries.	NT_P7S_UW01	project, presentation
U2	The student is able to formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.	NT_P7S_UW03	project, presentation
U3	The student is able to create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers	NT_P7S_UW04	project, presentation
U4	the student is able to use professional terminology in a foreign language	NT_P7S_UK07	written credit, project, presentation
Social competences – Student is ready to:			
K1	The student is ready to be innovativy and creativity in the agro-food field.	NT_P7S_KOR3	project, presentation
K2	The student is ready to apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_KO02	project, presentation

Balance of ECTS points

Activity form	Activity hours*
lecture	20
project classes/workshop	10
collecting and studying literature	6
exam / credit preparation	15
consultations	1
project preparation	14
class preparation	5
presentation/report preparation	4

Student workload	**Hours** 75	**ECTS** 3.0
Workload involving teacher	**Hours** 31	**ECTS** 1.0
Practical workload	**Hours** 10	**ECTS** 0.4

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Consumer's vs. innovations in foods of animal-origin. Challenges and innovations in meat products. Challenges and innovations in dairy products.	lecture
2.	Consumer evaluation of the selected product of animal origin-case study. Innovations and development in meat and dairy products-project and problem based learning. Presentation and defense of projects.	project classes/workshop

Course advanced

Teaching methods:

lecture, presentation / demonstration, project-based learning (PBL), problem-solving method, text analysis, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
project classes/workshop	project, presentation	50%

Literature

Obligatory

1. Recent articles from academic journals related to the course topic,e.g. Journal of Dairy Science, Poultry, Meat Science
2. Słodczyk, Janusz, Tomasz. Ciesielczuk, and Challenge Group A. J. Molscy. Innovations in Agri-food Industry. Warsaw: Challenge. Group, 2015. Print.
3. Modi, V. K, and Thakur, Monika. Emerging Technologies in Food Science: Focus on the Developing World. Springer, 2020.

Optional

1. Egbuna, Chukwuebuka., Genevieve. Dable-Tupas, and Springer. Wydawca. Functional Foods and Nutraceuticals : Bioactive Components, Formulations and Innovations. Cham: Springer, 2020. Print.
2. McClements, David Julian. Future Foods. Cham: Springer International AG, 2019.
3. Galanakis, Charis M. Innovations in Traditional Foods. San Diego: Elsevier Science & Technology, 2019.

UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Research oriented at improving animal product quality and safety

Educational subject description sheet

Basic information

Field of study Food Technology **Speciality** - **Department** The Faculty of Biotechnology and Food Science **Study level** Second-cycle (engineer) programme **Study form** Full-time **Education profile** General academic	**Education cycle** 2024/25 **Subject code** ND000000NFT-AMS.MI4BO.3254.24 **Lecture languages** english **Mandatory** optional **Block** major subjects (conducted) in foreign languages **Subject related to scientific research** Yes **Subject shaping practical skills** No

Teacher responsible for the subject	Anna Salejda
Other teachers conducting classes	Anna Salejda, Anna Dąbrowska, Małgorzata Korzeniowska, Gema Romero Moraleda

Period	**Examination**	**Number of ECTS points**
Semester 3	graded credit **Activities and hours** lecture: 20 project classes/workshop: 10	3.0

Goals

C1	The students will learn about the latest researches oriented at improving the quality and safety of animal products.
C2	The students will learn about researches oriented at improving the quality and safety of animal products developed on WUELS.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	The student understands and incorporates scientific advances in foods of animal origin that enable improving its quality and safety.	NT_P7S_WG04	written credit, project
W2	The student understands and applies scientific advances in animal production which can be used in R&D of animal production industries	NT_P7S_WG05	written credit, project
Skills – Student can:			
U1	The student is able to use tools to search for relevant and reliable information to resolve problems.	NT_P7S_UW01	project, presentation
U2	The student is able to develop and produce reports and procedures to manage food quality and safety based on continuous improvement.	NT_P7S_UW02	project, presentation
U3	the student is able to use professional terminology in a foreign language	NT_P7S_UK07	written credit, project, presentation
Social competences – Student is ready to:			
K1	The student is ready to critical and self-critical evaluate scientific advances in agro-food technology.	NT_P7S_KK01	project, presentation
K2	the student is ready to apply knowledge acquired and form judgments that include reflection on social and ethical repsonsibilities in the agro-food field.	NT_P7S_KO02	project, presentation

Balance of ECTS points

Activity form	Activity hours*
lecture	20
project classes/workshop	10
collecting and studying literature	6
exam / credit preparation	15
consultations	1
project preparation	14
presentation/report preparation	4
class preparation	5

Student workload	**Hours** 75	**ECTS** 3.0
Workload involving teacher	**Hours** 31	**ECTS** 1.0

Practical workload	Hours 10	ECTS 0.4

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	Global trends in animal based foods production. Research projects aimed at improving the quality and safety of meat and meat products. Research projects aimed at improving the quality and safety of poultry meat and eggs. Research projects aimed at improving the quality and safety of milk and dairy products.	lecture
2.	Quality and safety of the selected product of animal origin-case study. Improving animal product quality and safety-project and problem based learning. Presentation and defense of projects.	project classes/workshop

Course advanced

Teaching methods:

lecture, discussion, teamwork, presentation / demonstration, project-based learning (PBL), problem-solving method, case analysis

Activities	Examination methods	Percentage in subject assessment
lecture	written credit	50%
project classes/workshop	project, presentation	50%

Entry requirements

basic knowledge of animal production
basic knowledge of animal products technology
basic knowledge of animal products quality and safety

Literature

Obligatory

1. Modi, V. K, and Thakur, Monika. Emerging Technologies in Food Science: Focus on the Developing World. Springer, 2020.
2. Recent articles from academic journals related to the course topic,e.g. Journal of Dairy Science, Poultry, Meat Science
3. Lima, Giuseppina P. P, and Vianello, Fabio. Food Quality, Safety and Technology. Vienna: Springer Wien, 2013

Optional

1. Purslow, Peter P. New Aspects of Meat Quality. Cambridge: Elsevier Science & Technology, 2017. Woodhead Publishing Ser. in Food Science, Technology and Nutrition.
2. McClements, David Julian. Future Foods. Cham: Springer International AG, 2019.
3. Galanakis, Charis M. Innovations in Traditional Foods. San Diego: Elsevier Science & Technology, 2019.