Présidence
Vice-présidence CFVU
Direction Générale des services
Sylvie MONSINJON

DEPE
Affaire suivie par :
Marjorie CESNE
secretariatcfvu@univ-rouen.fr

CFVU
28 novembre 2025 - URN
Décision n°CFVU-2025-84

À l'ouverture de la réunion, le quorum est atteint par 34 votants dont 10 représentés

Ouverture du premier diplôme conjoint : parcours Technologie des Procédés Chimiques et Biochimiques au sein du Master Ingénierie de la Santé

- Vu la demande de création du parcours Technologie des Procédés Chimiques et Biochimiques au sein du Master Ingénierie de la Santé

Validation de la demande de création du parcours Technologie des Procédés Chimiques et Biochimiques au sein du Master Ingénierie de la Santé

Pour	33
Contre	0
Abstention	0

La CFVU approuve la demande de création du parcours Technologie des Procédés Chimiques et Biochimiques au sein du Master Ingénierie de la Santé.

Fait à Rouen, le 28 novembre 2025

Le Président de l'Université de Rouen Normandie

Franck LE DERF

Affaire suivie par :
Eric Dargent
*Vice-Président Relations internationales et Alliance européenne*VP

NOTE

Mont Saint-Aignan, le 12 novembre 2025

Aux élus.es de la CFVU

Objet de la note :
Création du parcours international "Chemical and Biochemical Process Technologies (CBPT)" – Mention Ingénierie de la Santé

La présente note a pour objet de présenter le projet de création du parcours international intitulé *Chemical and Biochemical Process Technologies (CBPT)*, rattaché à la mention de Master « Ingénierie de la Santé » de l'Université de Rouen Normandie. Ce parcours est développé dans le cadre d'un Master conjoint international réunissant trois établissements partenaires : l'Université de Rouen Normandie (URN, France), la Gheorghe Asachi Technical University of Iaçi (TUIASI, Roumanie) et l'Université d'Oviedo (UNIOVI, Espagne). Ce projet s'inscrit dans le cadre de l'alliance européenne INGENIUM, soutenue par la Commission européenne.

Langue de la convention et procédure d'accréditation

En raison de la nécessité pour le partenaire roumain de soumettre le projet de diplôme auprès du ministère roumain compétent, la convention de consortium relative à ce master conjoint a été rédigée en langue anglaise afin de permettre à TUIASI d'engager sans délai la procédure nationale d'accréditation. Une traduction intégrale en langue française sera réalisée ultérieurement, dès finalisation du processus d'approbation, dans le respect des dispositions légales et réglementaires applicables en France.

Contexte et justification du projet

Le programme CBPT s'inscrit dans la dynamique de développement de diplômes conjoints portée par l'alliance européenne INGENIUM. Cette initiative vise à renforcer la coopération académique, scientifique et culturelle entre établissements partenaires, et à promouvoir la mobilité

internationale des étudiants et enseignants au sein de l'Espace européen de l'enseignement supérieur. Le projet répond à une demande croissante d'experts capables de combiner des compétences en chimie, biotechnologie et ingénierie des procédés, tout en intégrant des approches orientées vers la durabilité, la santé et l'innovation industrielle.

Le parcours a été conçu en cohérence avec les compétences et les axes de recherche existants au sein de la mention Ingénierie de la Santé de l'Université de Rouen Normandie. Il repose sur la mutualisation de ressources pédagogiques déjà existantes et sur la complémentarité disciplinaire entre les trois établissements partenaires. Le programme est conforme aux standards de l'Espace européen de l'enseignement supérieur (EEES) et correspond au niveau 7 du Cadre européen des certifications (EQF7).

Présentation du programme

Le master conjoint *Chemical and Biochemical Process Technologies (CBPT)* est un programme de deux ans (quatre semestres, totalisant 120 crédits ECTS) dispensé intégralement en anglais. Il conduit à la délivrance d'un diplôme conjoint reconnu par les trois universités partenaires.

Le public visé est constitué d'étudiants titulaires d'une licence (ou équivalent) dans les domaines du génie chimique, biochimique, de la biotechnologie, de la chimie industrielle, de l'ingénierie environnementale ou de disciplines connexes. L'objectif principal est de former des spécialistes capables de concevoir, optimiser et innover dans le domaine des procédés chimiques et biochimiques, en intégrant les enjeux actuels de durabilité et d'innovation industrielle appliquée aux problématiques de santé.

Organisation académique et mobilité

Le parcours est organisé en quatre semestres successifs : le premier semestre se déroule à la Gheorghe Asachi Technical University of Iaçi (Roumanie) et porte sur les bases avancées en procédés chimiques et biochimiques ; le deuxième semestre est dispensé à l'Université d'Oviedo (Espagne) et traite des technologies de procédés et de leurs applications industrielles ; le troisième semestre a lieu à l'Université de Rouen Normandie (France) et est consacré aux biotechnologies industrielles, à la microbiologie appliquée et à l'innovation technologique. Enfin, le quatrième semestre correspond à la réalisation d'un stage obligatoire et d'un mémoire de master, effectués dans un établissement ou une entreprise du choix de l'étudiant parmi les pays partenaires.

Les étudiants français seront inscrits à l'Université de Rouen Normandie dès le premier semestre, tandis que les étudiants internationaux seront inscrits à l'URN à partir du troisième semestre, conformément au modèle de mobilité Erasmus+ classique. Tous les enseignements du semestre rouennais seront mutualisés avec des unités existantes dans les parcours de la mention Ingénierie de la Santé (IS-IQBIO, ESITech) et de Microbiologie (Microbio Santé, Bien-être et Industrie), traduits et dispensés en anglais. Au sein de l'URN, aucun nouvel enseignement ne sera créé spécifiquement pour ce parcours.

Gouvernance et pilotage

Le pilotage du programme est assuré par un Comité académique conjoint (Joint Academic Committee – JAC), composé de représentants des trois universités partenaires. Ce comité est chargé de la sélection conjointe des candidats, du suivi de la qualité académique, de la coordination des mobilités étudiantes et enseignantes, ainsi que de l'harmonisation des procédures pédagogiques et administratives. Tous les documents de suivi (comptes rendus, rapports qualité, modifications de maquette) seront archivés sur la plateforme numérique partagée de l'alliance INGENIUM.

Modalités d'admission et d'inscription

Les admissions seront gérées via la plateforme de sélection d'INGENIUM, coordonnée par l'Université de Crète, avec un processus conjoint d'évaluation piloté par TUIASI, université d'accueil du premier semestre. Les candidats devront être titulaires d'un diplôme de niveau licence dans un domaine pertinent, justifier d'un niveau d'anglais B2 minimum (certifié) et présenter un dossier académique complet assorti d'un entretien de motivation. La sélection se fera sur dossier et entretien selon une grille d'évaluation commune, et la capacité d'accueil prévue est de 10 à 30 étudiants par cohorte. Les étudiants bénéficieront du statut d'inscription conjointe dans les trois établissements partenaires.

Dispositif financier

Les étudiants acquitteront leurs droits d'inscription auprès de l'université du premier semestre, à savoir TUIASI (Roumanie). Des frais administratifs limités pourront être appliqués par les autres établissements conformément à leurs réglementations nationales. À l'Université de Rouen Normandie, les étudiants s'acquitteront de la CVEC ainsi que des frais d'inscription correspondant au niveau Master.

Au moins 10 bourses INGENIUM (20000€) seront attribuées aux meilleurs candidats européens pour la cohorte 2026-28. Ces bourses ne se substituent pas aux dispositifs Erasmus+ : les étudiants concernés pourront également solliciter une bourse Erasmus+ afin de compléter le financement de leur mobilité internationale.

Calendrier prévisionnel

Le calendrier de mise en œuvre prévoit une validation interne du projet à l'Université de Rouen Normandie (CFVU) au cours de l'année 2025, suivie de la signature du consortium agreement la même année. La première campagne d'admission se tiendra au printemps 2026 via la plateforme INGENIUM, pour un lancement officiel du programme à la rentrée de septembre 2026 à TUIASI.

Les étudiants de cette première cohorte poursuivront leur parcours au troisième semestre à l'Université de Rouen Normandie à l'automne 2027, conformément à la structure convenue du programme.

Création d'un parcours

Au sein d'une mention déjà existante

Composante : UFR ST

Type de diplôme :

- Licence
- Licence professionnelle
- **Master**
- Autre (précisez) :

Mention de rattachement : Ingénierie de la Santé

Intitulé du parcours souhaité *(une attention particulière doit être portée à l'intitulé, il figurera sur le parchemin remis en fin de cursus aux diplômés)* : Technologie des Procédés Chimiques et Biochimiques (Chemical and Biochemical Process Technology)

Responsables pédagogiques du parcours : Christophe Egles et Emeline Maillot

Etablissement partenaire ou co-accrédité : L'Université technique « Gheorghe Asachi » de Iasi (TUIASI), l'Université d'Oviedo (UNIOVI) et l'Université de Rouen, Normandie (URN) agissant dans le cadre de l'**ALLIANCE UNIVERSITAIRE EUROPÉENNE INGENIUM**

Lieu(x) d'enseignement : TUIASI en semestre 1, UNIOVI en semestre 2, URN en semestre 3, semestre 4 où les étudiants le désirent (Laboratoire, entreprise, …)

Accessibilité de la formation :

- **Formation initiale classique**
- Formation en alternance sous contrat (apprentissage ou contrat de professionnalisation)
- Formation continue

Dernière MAJ : 2 mai 2023

Modalité d'enseignement :

- Présentiel majoritairement mais également en Hybride

- A distance - En comodalité

Démarche d'identification du besoin auquel répond ce parcours : de nouvelles compétences en lien avec les techniques et technologies des procédés chimiques et biochimiques

Argumentaire pour la création en réponse au besoin : Dans le cadre de l'alliance INGENIUM, les trois partenaires proposent de délivrer un diplôme de master conjoint

Tableau de correspondance UE/Blocs de compétence : le tableau des enseignements est présent dans la convention jointe. Il sera décliné prochainement dans le format URN des tableaux d'enseignement.

Spécificité de la formation (à préciser le cas échéant) : Master conjoint avec la Roumanie et l'Espagne avec des déplacements sur chacun des semestres.

INGENIUM
European University

Agreement to implement a Joint Master Program in Chemical and Biochemical Process Technology

Co-funded by
the European Union

Call: ERASMUS-EDU-2022-EUR-UNIV (EUROPEAN UNIVERSITIES)
Topic: ERASMUS-EDU-2022-EUR-UNIV-2

Proposal number: 101090042
Proposal acronym: INGENIUM

Project duration: from 1 January 2023
to 31 December 2026

COORDINATOR
University of Oviedo (UNIOVI), Spain

PARTNERS
Medical University - Sofia (MUS), Bulgaria
University of Crete (UoC), Greece
Karlsruhe University of Applied Sciences (HKA), Germany
South-Eastern Finland University of Applied Sciences (XAMK), Finland
University 'G. d'Annunzio', Chieti-Pescara (Ud'A), Italy
University of Skövde (HS), Sweden
Munster Technological University (MTU), Ireland
University of Rouen, Normandy (URN), France
'Gheorghe Asachi' Technical University of Iasi (TUIASI), Romania

Project URL: https://ingenium-university.eu/

Co- Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor the granting authority can be held responsible for them.

Table of contents

Co-funded by the European Union

The Cooperation Agreement

1. Preamble

„Gheorghe Asachi" Technical University of Iasi (TUIASI), the University of Oviedo (UNIOVI), and University of Rouen, Normandie (URN) acting within the framework of the **INGENIUM EUROPEAN UNIVERSITY ALLIANCE** and recognizing the importance of academic cooperation for the development of higher education, hereby enter into this Agreement to implement a **Joint Master Program in Chemical and Biochemical Process Technology** (hereinafter referred to as "CBPT Program").

CBPT master programmes will be jointly organised by three partners on behalf of the INGENIUM European University: TUIASI, UNIOVI, and URN accredited higher education institutions, recognised by the home country, accredited following an external evaluation process carried out by a higher education quality assurance agency registered in the European Register for Quality Assurance in Higher Education. The partners already have accredited national and official Master programmes in Chemical and/or Biochemical Process.

The programme was selected as an "INGENIUM Flagship Programme" at the meeting of the INGENIUM Alliance Council in Chieti in October 2024.

The aforementioned three partners will act as degree awarding institutions, and they will be supported by the other 7 remaining partners of the INGENIUM European Universities Alliance, which will support the promotion, dissemination and continuous improvement of the programme, in line with INGENIUM´s objectives as outlined in its Mission Statement. The INGENIUM Academic Committee, including representatives from all universities, will also provide support in the implementation of the programme, and explore opportunities for direct involvement of other INGENIUM universities.

The Program aims to offer students an advanced, interdisciplinary education that combines expertise in chemical and biochemical engineering, enabling them to meet the challenges and demands of an evolving global industry. The development and delivery of the Program will be in full compliance with the European Approach for Quality Assurance of Joint Programmes and the European Standards and Guidelines for Quality Assurance (ESGs).

The programme has been designed taking into account the criteria for the European Degree Label approved by the Council of the European Union.

2. Scope of Policy and Procedures of this agreement

TUIASI

TUIASI's policy on collaborative provision allows for the establishment of joint programs, courses, and awards with selected partner institutions. This policy enables TUIASI to engage in partnerships that support the exchange of academics and students and the delivery of collaborative programs. The scope of collaboration includes both joint degree programs and collaborative teaching arrangements, including but not limited to: joint or double degree programs leading to awards conferred by both institutions, collaborative delivery of individual courses or modules that contribute to joint awards, exchange programs where students from one institution participate in classes or research at the partner institution, and collaborative research initiatives linked to teaching and learning outcomes.

Before proceeding with any collaborative provision or joint award, TUIASI requires approval from several internal and external bodies to ensure alignment with institutional and national academic standards. These include, for internal approval, the Faculty Council must review and approve any proposed joint programs or collaborations, and the University Senate has to endorse the proposed program, ensuring that it meets the academic standards and strategic objectives of TUIASI. The Departmental Chairs and Faculty Deans must be consulted to ensure that the proposed collaboration fits within the respective faculties' academic educational capabilities and priorities. For external approval: The Romanian Agency for Quality Assurance in Higher Education (ARACIS) must approve joint programs in line with national accreditation standards, ensuring that the program meets the required quality and compliance criteria. The joint degree must be organised by accredited Romanian higher education institutions (HEIs) jointly with accredited HEIs from the European Higher Education Area (EHEA), according to the provisions of art. 8 para. (5), art. 28 para. (6) and (12), art. 30 para. (2) and (6), art. 39 para. (5), art. 102 para. (3) letter f and para. (8) of Law no. 199/2023 on higher education, as subsequently amended and supplemented, and of the Framework Methodology for the organization and functioning of integrated university study programs organized within higher education institutions in Romania, completed with a joint diploma, approved by order of the Minister of Education no. 4637/2024.

TUIASI’s Quality Assurance (QA) procedures are structured to uphold the highest standards of academic quality, guided by the university’s core values of academic freedom, integrity, and openness to international collaboration. These procedures ensure that all joint degree programs are aligned with both national and European accreditation standards and that they foster the promotion of science in the spirit of European values, culture, and civilization. TUIASI is committed to increasing the quality of its educational activities by continuously accrediting Bachelor’s and Master’s degree programs and ensuring that the highest possible quality standards are met in terms of educational efficiency and academic quality. This aligns with TUIASI's broader goal of promoting a culture of excellence, transparency, and integration into the international scientific

community. All joint programs must comply with the accreditation standards set by the Romanian Agency for Quality Assurance in Higher Education (ARACIS) and relevant European bodies. Each proposed collaboration must go through a rigorous process to ensure it aligns with the university's goals and is structured for success. In accordance with TUIASI's policy, collaborative teaching arrangements must ensure academic rigour and quality. Regular reviews and evaluations will be conducted to monitor the quality of delivery and to ensure that the learning outcomes of the joint program meet the standards set by both TUIASI and the partner institution. For any joint awards, TUIASI must ensure that all institutions involved meet the criteria for awarding degrees as per national and international guidelines.

UNIOVI

At UNIOVI, new programs must fulfill the requirements of the Spanish legislation regarding the organisation and structure of official university education: Royal Decree 822/2021 of 28 September, establishing the organisation of university education programmes and the quality assurance process thereof, and Decree 90/2009 of July 29, on official university education and centres in the Principality of Asturias. Official programs, recognized and accepted as higher education, must be revised and approved by the Spanish Ministry of Universities and included in the "*Registro de Universidades, Centros y Títulos*" (RUCT). This requires that the program is accredited by a higher education accreditation agency that is a member of the **European Association for Quality Assurance in Higher Education** (ENQA). The approval of new programs at the University of Oviedo requires many steps with the participation of several entities. The program of the CBPT Master will have to be approved by the Department of Chemical and Environmental Engineering, the Faculty of Chemistry, the University Council, the Regional Asturian Government, and the Spanish Ministry of Universities. The later step requires the previous accreditation of the program by an accreditation agency, member of ENQA.

At UNIOVI, the Internal Quality Assurance (QA) procedures are managed by the Quality Technical Unit (UTCal). The aim of this unit is the promotion and continuous improvement of quality at the University of Oviedo through the evaluation of the degrees, the teaching and the services. The UTCal offers the following services: design and implement Internal Quality Assurance Systems for Bachelor's, Master's, and Doctoral degrees, monitor the development of the programs through student and academic staff satisfaction surveys, support the continuous improvement of the programs by promoting and managing improvement plans for the centres evaluated, participate in national and international forums for the exchange and dissemination of university quality improvement initiatives, and disseminate information prepared or available from the UTCal online.

The External Quality Assurance agency for higher education of SPAIN is called ANECA (Agencia Nacional de Evaluación y Acreditación), which is equivalent to ARACIS. It is member of the European Association for Quality Assurance in Higher Education (ENQA).

URN

URN is permitted to engage in collaborative provision, including joint and double degree programmes, within the framework established by national regulations and institutional governance structures. URN's policy supports the development of partnerships that enhance internationalisation, strengthen academic cooperation, and promote mobility of students and staff, in line with its strategic objectives and international partnerships.

The scope of collaborative provision at URN includes:

- Joint or double degree programmes leading to one or more qualifications awarded by URN and one or more partner institutions;
- Collaborative course/module delivery, where elements of a study program are delivered jointly across institutions;
- Student and staff mobility schemes linked to jointly delivered programs;
- Research-led teaching collaborations that inform the curriculum and benefit from shared expertise and infrastructure.

Before launching any collaborative program or joint award, URN requires both internal and external validation to ensure academic quality, institutional capacity, and regulatory compliance. The internal validation process at URN involves approval by the Faculty Council, the Committee for Education and Student Life (Commission de la formation et vie étudiante universitaire – CFVU).

URN applies equivalent internal and external quality assurance procedures as outlined for TUIASI, with HCERES serving as the external Quality Assurance Agency, fulfilling a role analogous to that of ARACIS in the Romanian context.

3. Description of the INGENIUM Partner Collaboration

This Interinstitutional Agreement for the joint master program **Chemical and Biochemical Process Technology (CBPT)** is established between:

- „Gheorghe Asachi" Technical University of Iasi (TUIASI), Romania, Located at D. Mangeron, Iasi, Romania, Represented by Rector, Prof.univ.dr.ing. Dan Cascaval,
- University of Oviedo (UNIOVI), Spain, San Francisco Street 3, 33003, Oviedo (Asturias), Represented by Rector Ignacio Villaverde Menéndez, and
- University of Rouen Normandy (URN), France, 1 rue Thomas Becket, 76821 Mont-Saint-Aignan cedex, Represented by its President, Mr. Franck Lederf

These Parties are members of the INGENIUM Alliance. All the remaining INGENIUM partner universities are committed to the promotion, dissemination, and continuous improvement of the programme.

3.1 Names and description of collaborative partners

TUIASI (public university) is among the oldest and best-known higher education institutions in Romania with an important tradition in engineering, scientific and cultural education and a thriving presence on the international scene. Classified by the Ministry of Education as an advanced research and education university, TUIASI offers 4-year programs, awarding the degree of Bachelor of Science ("Engineer"), and graduate/postgraduate programs awarding the degrees of Master and Doctorate/PhD. TUIASI has a strategic plan and yearly operational plans focused on all main areas of institutional operation: education, research, involvement in social economic and cultural activities, internationalization, investment policy, computerization, digital communication, and image of the university.

The University of Oviedo (**UNIOVI)** is the public institution of higher education and research of Asturias (Spain). With more than 410 years of history and 21 000 students, it has a complete range of 4-year Bachelor's degrees and 1 or 2-year Master's degrees adapted to the European Higher Education Area in all branches of knowledge. Also, bilingual itineraries, double degrees with international universities, and Erasmus Mundus and interuniversity Master's degrees and in collaboration with more than 250 companies. The University of Oviedo has a clear international vocation and belongs to the INGENIUM association, a strategic alliance of ten European universities that aims to provide excellent,

international, inclusive, and socially responsible education. Our goal is to educate professionals and citizens who can contribute to the well-being of society.

University of Rouen Normandy (URN - public university) is a multidisciplinary higher education and research institution located in north-western France. As an *établissement public à caractère scientifique, culturel et professionnel (EPSCP)*, it is fully recognised and accredited by the French Ministry of Higher Education and Research under the provisions of the French Education Code (*Code de l'éducation*). URN awards nationally recognised qualifications at all levels of the European Higher Education Area (EHEA), including the Licence (Bachelor), Master, and Doctorate/PhD degrees, in line with the LMD (Bologna) framework and the use of the European Credit Transfer and Accumulation System (ECTS).With more than 30,000 students and seven campuses across the Normandy region, URN combines a wide disciplinary scope with recognised research excellence in health, sciences and technology, humanities, law, economics, and social sciences. The university has a strategic plan and annual operational priorities covering education, research, internationalisation, sustainability, digital transformation, and engagement with regional, national, and international stakeholders.

All universities engage to take part in the efficient implementation of the CBPT Master Program, and to cooperate, perform and fulfil, promptly and on time, all of its obligations under this Consortium Agreement as may be reasonably required from it and in a manner of good faith. Each Party undertakes to notify promptly any significant information, fact, problem or delay likely to affect CBPT Master Program.

3.1.1 Joint programme design process

The CBPT Joint Programme was initiated under the framework of the INGENIUM European University Call for Collaboration on the development of joint academic offers, launched in March 2025 (https://ingenium-university.eu/iec-faculty/call-for-the-development-of-joint-academic-offers/). This initiative invited higher education institutions within the INGENIUM Alliance to co-design innovative, internationally study programmes that foster mobility, interdisciplinarity, and flexible learning pathways across Europe. In response to this call, TUIASI, UNIOVI and URN jointly proposed the creation of a Master Programme in CBPT, aligning with the strategic objectives of the INGENIUM Alliance to promote shared European education standards and cross-border academic cooperation.

The design process began with an in-depth comparative analysis of existing Master's programmes delivered in English at each partner university. Building upon these foundations, academic representatives from all three institutions engaged in multiple rounds of consultations to harmonize course structures, identify common academic goals, and define a unified set of learning outcomes.

Through collaborative curriculum mapping, the partners jointly developed a teaching plan, integrating complementary expertise and course modules from each institution. The programme structure was designed to ensure academic coherence, mutual recognition of credits, and opportunities for student mobility. Continuous input from institutional quality assurance units and the INGENIUM Alliance Council (IAC) ensured that the programme adhered to national and European accreditation requirements and aligned with the INGENIUM vision of building internationally recognized study pathways.

Following the endorsement of the IAC and the outcomes of the INGENIUM Joint Education Call (https://ingenium-university.eu/iec-faculty/ingenium-joint-programmes-2/master-programme-in-chemical-biochemical-process-technologies/), the consortium partners formalized their commitment to deliver the CBPT joint programme. The programme was selected as an "INGENIUM Flagship Programme" at the meeting of the INGENIUM Alliance Council.

3.2 Award title

Graduates of the *Joint Master's Programme in Chemical and Biochemical Process Technology (CBPT)* will be awarded a **Joint Degree** * of the partner universities: Gheorghe Asachi Technical University of Iași (TUIASI), University of Rouen Normandy (URN), and University of Oviedo (UNIOVI).

The award will reflect the collaborative nature of the programme and will clearly mention the names and logos of the awarding institutions. The degree will be conferred at **EQF Level 7** (corresponding to the master's level in the European Qualifications Framework), in accordance with national legislation and joint programme guidelines.

Graduates will receive a Joint Master's Diploma in *Chemical and Biochemical Process Technologies (CBPT)*, awarded by the consortium of universities, compliant with the respective national regulations and EU standards. The diploma will be recognized in each partner country, in accordance with the national higher education legislation of Romania (Education law 199/2023), Spain (Royal Decree 822/2021 of 28 September, establishing the organisation of university education programmes and the quality assurance process thereof, and Decree 90/2009 of July 29, on official university education and centres in the Principality of Asturias), and France (French *Code de l'Éducation,* notably Articles L123-7, L123-7-1, L613-1, D123-15 to D123-22, D613-17 to D613-25, and D719-181 to D719-185, which governs the organization of higher education, including the creation of national diplomas and the recognition and transfer of academic credits (ECTS)), as well as with the European Standards and Guidelines (ESG) and the principles of the European Approach for Quality Assurance of Joint Programmes.

The Royal Decree 1002/2010, of 5th August, about the issuance of official university degrees in Spain, indicates the procedure graduates have to follow so that a Joint degree diploma take effect in Spain, when the issuance of the diploma corresponds to a foreign University. To take effect in Spain, the diploma must be presented to the Spanish University of the agreement (UNIOVI), so that it includes a document indicating to which official Master's Degree of the Registry of Universities, Centres and Degrees (Registro de Universidades,

Centros y Títulos, RUCT) corresponds this diploma. Also, UNIOVI will proceed with the necessary procedures for the registration of the diploma and graduate name in the National Registry of Official University Graduates (Registro Nacional de Titulados Universitarios Oficiales).

3.3 Role of each partner in the consortium

The CBPT Programme will be implemented in observance of the respective national laws and regulations in the countries of the partner universities, in particular the higher education laws. In this consortium, for CBPT master program, each partner institution has a specific role and responsibility to ensure the successful implementation and management of the joint degree program:

TUIASI (Lead Partner) is responsible for the overall coordination and management of the joint degree program. This includes ensuring compliance with all academic, administrative, and regulatory requirements.

UNIOVI and URN (Associate Partner) will contribute to the educational and research components of the joint degree program.

The partner institutions will participate in delivering specific components of the joint degree program, in alignment with the curriculum developed together. This includes ensuring the academic quality of their modules and contributing to the overall student learning experience.

All collaborative teaching and assessment activities must adhere to European Quality Assurance policies (European Approach to Quality Assurance of Joint Programmes, European Standards and Guidelines) and INGENIUM Quality Assurance Procedures, promoting a culture of mutual respect between students and teachers, while upholding the principles of academic freedom and integrity.

All partners will provide student support services, including advising, mentoring, and other services that contribute to the overall success of students participating in the program. TUIASI, UNIOVI and URN will contribute to research activities related to the program, facilitating joint research projects and providing opportunities for students and academic staff to engage in collaborative research.

Each partner will provide resources and expertise in their specific academic domains, contributing to the overall quality and scope of the program. The mobility partners will ensure seamless credit transfer and the consistency of academic outcomes across all institutions.

The joint diploma is issued by TUIASI, the template is approved by all partners.

3.4 Mobility journey

According to the CBPT curriculum, the program will have 120 ECTS, structured in 4 semesters (each of 30 ECTS):

- **First semester:** modules delivered at TUIASI
- **Second semester**: modules delivered at UNIOVI
- **Third semester:** modules delivered at URN.
- **Fourth semester**: Master's thesis. During this part, the students will be distributed among the partner institutions, allowing for close academic collaboration with faculty members in their chosen research areas

Each student shall be subject to the national legislation and institutional regulations of the country in which they are enrolled. A coordinated recruitment process will be implemented for the fourth semester, during which students will undertake a mandatory internship in either an industrial setting or a university research laboratory, with financial compensation provided in accordance with the applicable national laws.

The partner institutions agree to co-operate fully in relation to any audits, reviews, evaluations and quality assurance processes, monitoring, assessments and reports undertaken by any partner institution. The partner institutions will provide, within fourteen working days of receipt of a request for assistance from any other partner institution, any information in its possession or power to obtain as may be reasonably requested in order to assist the other partner institution in complying with its obligations under its national legislation.

3.5 Programme Governance

The governance of the Joint Master's Programme in CBPT is structured to ensure effective academic, administrative, and strategic oversight across all partner institutions: TUIASI, URN, and UNIOVI, while serving as a link with the other structures of the INGENIUM European Universities Alliance.

The governance of the programme will be carried out in full alignment with the fundamental values of the European Higher Education Area.

All governance decisions, including curriculum modifications, meeting minutes, and quality reports, are documented and stored on a shared digital platform accessible to all partners within the INGENIUM repository. This ensures transparency and facilitates external audits and accreditation processes.

3.5.1 The Joint Academic Committee (JAC)

At the core of this governance structure is the **Joint Academic Committee**, which serves as the primary coordinating and decision-making body. The JAC is responsible for all aspects related to the coordination of the programmes, unless otherwise stated in this agreement.

In cases of academic or administrative disputes between partner institutions, resolution efforts begin within the JAC.

If necessary, unresolved issues are escalated to the rectors of the participating universities and handled according to the terms outlined in the Consortium Agreement.

Decisions in the JAC are taken by consensus. In case that a consensus can not be reached, the partner may carry out a vote, with a voting weight of one vote per institution.

The meetings of the JAC are chaired by the academic representative of the coordinating institution (TUIASI).

The JAC should meet at least twice a year to carry out the functions defined below. Any member of the JAC may request an extraordinary meeting to the Chair, which should call it within the following 2 weeks.

The three academic representatives and at least one of the student representatives should be present in order to reach a quorum.

Student representation is a fundamental component of the program's governance and quality assurance mechanisms. Students participate in the JAC and are actively involved in regular surveys, focus groups, and consultations, ensuring that their input informs program development and evaluation processes.

Composition of the JAC

The members of the JAC are:

1. **One academic representative per partner institution,** with voting rights.
2. **Two elected student representatives.** The student representatives will be elected no later than one month after the beginning of each academic year. Their term will last until the end of the academic year. Student representatives will have the right to propose topics, speak, and share their opinions, which should be taken into account in all cases. They will not have the right to vote.
    a. Due to the nature of their mandate, students will not participate in selection processes assigned to the JAC.
3. At least one **representative of the INGENIUM European University management**.
4. At least one **administrative /quality assurance officer**.

Any member of the JAC may propose the invitation of guests to the meeting. Guests invitations will be deemed as accepted unless explicitly rejected by the other JAC members.

Functions of the JAC

The JAC is responsible for all the programme coordination functions described in this agreement, including:

1. Coordinating student admissions and selection, following the procedure described in this agreement
2. Oversee academic standards, curriculum design and alignment and other relevant academic activities to ensure consistency and quality.
3. Supporting the continuous enhancement of the program, ensuring that equivalent teaching standards are uphold throughout the whole learning journey of enrolled students.
4. ensuring consistent learning outcomes and credit allocation
5. Manage all aspects related to the management of the programme, including disciplinary aspects
6. Any other function assigned in this agreement

3.5.2 The continuous improvement council

The continuous improvement commission is a consultative body that supports the JAC to ensure that the curriculum and implementation of the programme is continuously improved and that it is adapted to societal needs.

The council should meet at least once per year and include:

1. The JAC members.
2. At least one representative from industry, selected by the JAC
3. Representatives from the INGENIUM Alliance bodies dealing with pedagogical innovation, sustainability, and inclusion.
4. Representatives from INGENIUM European Universities that are not degree-awarding partner in the programme
5. After the first cohort of the programme graduates, at least one alumnus from the programme

The council meeting should result in the production of a set of recommendations for potential improvements to be incorporated into the programme.

3.5.3 Support structures to the programme

The consortium partner commit to the creation of all the necessary support structures to the programme, bringing together representatives from the different units involved in the management of the different components of the programme.

The JAC will be responsible for requesting the creation of these support structures and ensuring effective coordination.

The list of support structures includes, but is not limited to:

1. Erasmus+ mobility coordinators
2. Student services (responsible for admission and enrolment)
3. Inclusion and student support
4. Employment offices

3.6 Admission and enrolment

The admission of candidates to the CBPT program is carried out under the conditions imposed by national regulations and the regulations in force of the organizing higher education institutions.

Pre-registration will be carried out at each partner university during the spring semester, as part of the joint admission procedure. This step is essential to ensure students' eligibility for financial support and to facilitate administrative and logistical planning across institutions.

As the first semester will be hosted by TUIASI, the formal admission process will be coordinated by TUIASI, in accordance with Romanian national regulations. Nevertheless, a unified joint admission policy will apply across all three partner institutions. Students will be able to access the application form through the INGENIUM platform, which will re-direct them to the TUIASI system, following the agreed common procedures. A list of candidates will be sent to the coordinators of UNIOVI and URN, and a sorted list of admitted candidates approved by the coordinators of the 3 partner Universities**.** The selection of candidates will be conducted by the JAC.

For the first cohort, the minimum number of students enrolled in the program is 10, and the maximum is 30.

This number may be reviewed every year at the request of one of the partner Institutions. If it is not reviewed, the number will remain as stated in the present agreement. The enrollment of candidates declared admitted following the admission competition is made by the decision of the rector of TUIASI. The candidate declared admitted to the joint master program has the status of student for the entire period of his/her presence in the respective program, from enrollment until taking the final exam or expulsion, except for periods of interruption of studies. Students admitted to CBPT programs are registered in the Unified Matriculation Register of Romania/Unique National Integrated Register of Diplomas and Study Documents (RMUR/RUNIDAS), in accordance with the legislation in force.

3.6.1 Enrolment requirements

The requirements for the enrolment in the CBPT Master are:

1. Bachelor’s degree in a relevant field

2. English language certification
3. Academic record and motivation letter

The applicants must have a Bachelor's degree in the following relevant fields (or equivalent):

1. Chemical Engineering
2. Biochemical Engineering
3. Biotechnology / Biology
4. Chemistry / Industrial Chemistry
5. Environmental Engineering / Science
6. Food Science / Food Engineering / Science
7. Pharmaceutical Sciences
8. Biomedical Engineering

Applicants must demonstrate proficiency in English: minimum B2 level (certified by an official institution).

The selection of candidates will be conducted by the Joint Academic Committee, composed of representatives from each partner university.

The following items will be considered by the Committee to evaluate the candidates:

1. Bachelor's degree academic record and its adequacy to the Master
2. Professional knowledge
3. Communication abilities and motivation, evaluated in an interview

The academic record is an official document that enumerates all the modules of the Bachelor's degree and their corresponding marks.

3.6.2 Formula to determine enrolment priority

The admission process involves the calculation of an admission average according to the following formula:

- MA = 0.6 × MF + 0.4 × MC, where:
- MA = Admission contest average (entrance exam average)
- MF = Bachelor's degree final grade (Bachelor's or Diploma degree, Final grade)
- MC = Average score for the assessment of specific knowledge in the field of study, including professional knowledge, and communication abilities and motivation evaluated during an online interview. In the case of candidates obtaining identical final examination averages, ranking shall be determined based first on the grade obtained for the Bachelor's/Diploma thesis defense and, if necessary, on the overall graduation average for the undergraduate (first cycle) studies.

The Joint Academic Committee will publish a ranked list of admitted candidates based on the number of available positions. The top-ranked candidates will be offered admission to the Master's programme. In the event that an admitted candidate withdraws, the next candidate on the list will be offered the vacant position, in order of ranking.

INGENIUM scholarships may be awarded each year according to the same ranked list of candidates, within the limits of the scholarships available.

Admitted students will have the opportunity to participate in Erasmus+ mobility for study placements at partner institutions.

All academic activities undertaken at any of the consortium universities will be fully recognized through established academic equivalence mechanisms. TUIASI Admission Regulations, annexed to this Agreement, provide detailed guidelines on the application, selection, and admission procedures. This includes criteria for eligibility and selection, as well as the procedures for application and admission.

Citizens of European Union member states, the European Economic Area Member States, or the Swiss Confederation have the right to apply for graduate studies at Romanian higher education institutions under the same conditions as Romanian citizens.

Non-EU citizens who wish to study in Romania need to submit their applications directly to the Romanian university of their choice. The Letter of acceptance is issued by the Ministry of Education and represents the final document, necessary and compulsory to study in Romania.

To be eligible, non-EU candidates must ensure that their educational diplomas are validated by the Romanian National Centre for Recognition and Equivalence of Diplomas (CNRED). Applications for recognition may be submitted either directly to CNRED or through the university, at least 30 days before the admission online or by mail or express courier to: Ministry of Education and Research Registration Office, 10 Spiru Haret Street, District 1, 010176, Bucharest, cnred@edu.gov.ro.

The candidates to admission will submit the international English certificate or English certificate issued by an accredited institution from Romania and a Medical certificate (in an international language) proving that the person to enroll in studies not suffer from contagious diseases or other illnesses incompatible with the future profession.

3.6.3 Promotion of the programme

The promotion of the degree program and awareness-raising shall be the joint responsibility of all Partner Institutions, with the support of all the partners of the INGENIUM European University. The programme will be considered as a de facto programme of the remaining INGENIUM partners

All institutions inform candidates by posting at the institutions' headquarters and on their own website, information regarding tuition fees, the organization and conduct of the admission process, the content of the study program, the organization of the educational

process, the number of places available, according to the provisions of inter-institutional agreements.

The INGENIUM alliance will publicize the CBPT master within their network. This will provide a good platform to inform prospective students and connect them to the Master administration or academic board in order to answer their queries about the program.

Once admitted, the students will enroll at TUIASI, and all the information will be shared with the other partner universities, thus minimising the administrative burden for students.

3.7 Access to information and transparency

All the relevant programme information and documentation will be publicly available on the programme´s website (included within the INGENIUM website) and respective websites of the partners. The information will be available in English and the three official languages of the partners.

The JAC will also commit to keep public records of all the programme management decisions and make them accessible to students and other interested partner upon requests as long as this does not go against any regulations.

The essential information to be communicated publicly through the programme website includes:

1. **Programme Description**:
   - Objectives and learning outcomes
   - Programme structure and curriculum
   - Mobility plan and academic calendar
   - Admission requirements and selection criteria
   - Fee structure and scholarship opportunities
2. **Module Information**:
   - Complete module descriptors for all taught modules
   - Reading lists and resources
3. **Teaching Staff**: Brief profiles with research interests
4. **Application Process**:
   - How to apply, deadlines, required documents
   - Selection process and timeline
   - FAQs for applicants

5. **Student Life**:
   - Student testimonials and experiences (to be included after the first cohort)
   - Information about each city/campus
   - Accommodation options
   - Living costs estimates
6. **Career Outcomes (to be included after the first cohort finalises the programme)**:
   - Graduate employment statistics
   - Alumni profiles and destinations
   - Employer testimonials
7. **Key Documents** (public-facing versions):
   - Consortium agreement summary
   - Student handbook
   - Code of conduct
   - Examination and assessment regulations
8. **Contact Information**:
   - Programme coordinators at each institution
   - Enquiry email
   - Social media links

Languages: Information available in English and all three partner languages (Romanian, Spanish, French)

Updates: Website updated at least annually, with news/blog updated regularly

Accessibility: Website compliant with WCAG 2.1 accessibility standards

3.8 Student mobility model and arrangements

CBPT Program will be structured over 4 semesters, with students completing mobility at all three partner institutions. Students will spend a minimum of 1 semester at each institution, with opportunities for internships, research projects, and thesis work to be completed collaboratively.

All institutions involved in the mobility will facilitate the visa process (if required), accommodation, and integration support for exchange students. All universities will monitor student progress, ensuring the achievement of learning outcomes and academic success. Regular assessments, feedback, and evaluations will be conducted.

Students are obliged to complete the mobility path set out below:

Table: Mobility plan

Semester	Institution(s)	Details of Mobility
1st Semester	TUIASI	Students will complete the first semester of the program at TUIASI.
2nd Semester	UNIOVI	Students will complete the second semester at UNIOVI.
3rd Semester	URN	Students will complete the third semester at URN
4th Semester	TUIASI, UNIOVI, URN	Students will be assigned to a partner institution based on their dissertation topics.

The mobility support measures are described in section 8 of this agreement

Regular information sessions will be organized to ensure that all stakeholders (students, faculty, and staff) are well-informed about the progress, updates, and key milestones of the joint degree program. Information sessions will be held at key stages of the program, such as at the beginning of each semester or before the start of the mobility periods. Additional sessions may be scheduled to address specific topics like the dissertation process or career opportunities.

Meetings will be held by the Joint Academic Committee between TUIASI, UNIOVI and URN every semester to review the program's progress, resolve issues, and discuss improvements. Additionally, the online INGENIUM alliance platform (will be used to facilitate real-time communication and document sharing among academics, students, and administrators from all three institutions.

3.9 Financial Plan

The consortium agrees on a common tuition fee for the programme, while permitting each partner to levy any mandatory local fees required by national, regional or institutional regulations. Any such fees will be transparent and kept to a minimum.

If any of the partners needs to charge local enrollment or service fee, the consortium will clearly communicate this to applicants in advance. All partners remain committed to minimizing costs and will exempt students from duplicate tuition charges. Once the base tuition is paid, no full tuition is charged a second time at mobility destinations, ensuring students do not pay double for joint enrollment.

The fees will be levied at the beginning of each semester by the respective partner institutions. A table explaining in detail all the fees and expenses will be included in all promotional materials of the programme.

3.9.1 Fee policy

Under this policy, students will have the following tuition fee conditions:

TUIASI (enrollment)

1. EU/EEA students will pay no fee when enrolling for the programme in TUIASI.
    a. EU candidates eligible for subsidized places shall be selected according to the number of places approved by the Romanian Ministry of Education and in line with the criteria established in the admission methodology mentioned above.
2. TUIASI charges fees for non-EU students, including an admission fee established each academic year and a tuition fee established each academic year (2430 € for 2056-2026 - https://study.tuiasi.ro/fees/).

UNIOVI

3. Students will pay a local fee at the University of Oviedo. The exact fee will be determined by the Regional Government and announced before student recruitment starts each academic year. The exact fee will depend on the nationality/residency status of the students:
    a. **Group 1**: European Union countries and selected countries (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Equatorial Guinea, Haiti, Honduras, Morocco, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Dominican Republic, Uruguay, and Venezuela).
    b. Group 2: All other countries.

URN

4. All students (regardless of nationality) will pay the following administrative fees:
    a. tax for student life (Contribution to Student and Campus life – reference amount25/26: 105 euros)
    b. Fee for admission (reference amount 25/26: 254 euros)

All payments will be made online, with detailed instructions and necessary payment information available on the admission website.

3.10 Scholarships and Mobility Support:

The CBPT is committed to exploring all possible opportunities for the provision of scholarships to students enrolled in the programme.

The consortium confirms that at least 10 mobility support scholarships of a maximum of 20.000 EUROS per student for the two-year programme is secured for the first student cohort starting in the academic year.

Beneficiaries must sign a student agreement committing to the successful completion of the programme in order to receive the full scholarship. In case of non-completion or breach of the students' obligations described in the student agreement, students will have to reimburse the consortium.

These scholarships are funded through alliance and institutional resources and will be disbursed to top-ranked admitted EU students (as decided by the Joint Academic Committee), in order to ensure compatibility with the conditions of the European Universities call.

The stipend is intended to cover living expenses during the 24-month programme. The consortium will seek to extend or increase the scholarship funding for future intakes if additional resources (e.g. new Erasmus+ funding or external grants) are obtained.

All three universities and the INGENIUM alliance have committed institutional funds to co-finance the programme this covers teaching costs, programme administration, and student support services at each campus. This blended funding approach (tuition fees + scholarships + Erasmus+ grants + direct alliance support) ensures the financial sustainability of the programme and equity of access for students, following the example of other joint degrees under European University alliances.

Beneficiaries of this scholarship won´t be eligible for Erasmus+ KA131 mobility support.

This scholarship model, including the funding allocation, will be reviewed annually by the Joint Academic Committee. The model will be renewed and potentially adapted if the consortium attracts enough funding. If the funding is not available, the programme will continue to provide Erasmus+ mobility scholarships as described in the next section of this agreement.

Students will also be supported to access other types of scholarships by the Joint Academic Committee and the partner institutions.

Students who are not receiving these scholarships will be supported in their mobility by Erasmus+ travel grants and local funding. In line with Erasmus Mundus practices, such students can apply for Erasmus+ mobility stipends to assist with the costs of the mandatory study periods abroad.

The conditions for Erasmus+ scholarships are described in the section below.

3.9.1 Mobility support through Erasmus+ funds

In line with the conditions described in the Erasmus+ programme guide, mobilities within this joint degree programme are eligible to receive Erasmus+ student mobility support.

Erasmus+ funds can support a maximum of 12 months of student mobility. The partner universities commit to providing funds for the 12 months mobility to all students enrolled in the programme.

Erasmus+ representatives from the partner universities will support the Joint Academic Committee in the management of Erasmus+ scholarships.

The funding allocation will be divided between the partner universities. The partners may use the model included below, or any other option aligned with Erasmus+ regulations.

The group of Erasmus+ officers supporting the programme will monitor the implementation of Erasmus+ mobilities, following the instructions of the Joint Academic Committee.

Table: Erasmus+ mobility funding structure

	First Mobility	Second mobility
Hosting university	UNIOVI	URN
Funded by	TUIASI	UNIOVI
Max funded months	6	6

3.10 Staff qualification and training

All institutions will provide qualified teaching staff and administrative personnel to deliver CBPT Program, ensuring continuity and academic excellence. All three Universities involved TUIASI, UNIOVI and URN will provide the necessary training for academic staff and administrative personnel involved in the joint degree program. This training will cover key topics such as curriculum delivery, quality assurance procedures, student mobility processes, and the use of shared learning platforms.

Training sessions will be scheduled prior to the start of the program and will be delivered in both in-person and online formats to accommodate staff availability across institutions. Staff exchanges will be encouraged to foster collaboration, enhance teaching practices, and ensure academic alignment between the institutions.

Personnel covered by this Agreement will continue to comply with the contractual obligations of their originating university and will continue to receive their due remuneration. In each case, the originating university will consider the duration of the stay as an ordinary service period, for all intents and purposes.

The Parties agree that all financial issues relating to payments due to mobile staff will be negotiated during the delivery of the program and will depend on the availability of funds.

3.11 Availability and use of partner facilities, infrastructure and resources

The consortium partners confirm the availability of suitable facilities, infrastructure and resources for the implementation of the programme. The resources available across the three partner universities meet all the necessary quality standards to ensure that students will benefit from quality education across all three semesters.

Students will be able to access all the necessary resources and infrastructure (laboratories, student spaces) during their stay at each of the partner institutions.

Other resources (such as online resources, access to online learning and other support services) will also be made available to all students throughout the whole duration of the programme.

4. Core academic information

4.1 Programme Title

The official programme Title is Joint Master's Program in Chemical and Biochemical Process Technology (CBPT)

4.2 Introduction to the academic programme

The joint master's programme in *Chemical and Biochemical Process Technologies (CBPT)* is an interdisciplinary and internationally oriented study programme developed collaboratively by:

1. Gheorghe Asachi Technical University of Iași (TUIASI) – Romania
2. University of Rouen Normandy (URN) – France
3. University of Oviedo (UNIOVI) – Spain

This joint degree aims to provide students with a high-level scientific and technical education focusing on the design, analysis, and optimization of chemical and biochemical production processes.

CBPT responds to the increasing global demand for specialists capable of innovating and improving production systems by integrating chemical and biochemical engineering principles. The programme is designed for students with academic backgrounds in chemical engineering, biotechnology, industrial chemistry, and related fields.

The programme is aligned with the requirements for the competences and skills corresponding to EQF 7 in the qualifications frameworks of the three partner institutions.

4.3 Programme Overview

The CBPT programme offers:

- A multidisciplinary curriculum covering chemical process technology, biotechnology, and environmental process design.
- Hands-on learning through laboratories, research projects, case studies, and Erasmus+ mobilities.
- Strong industry relevance, with opportunities for interaction with industrial partners, site visits, and participation in real-life projects.

4.3.1 Programme Objectives

Graduates of the CBPT programme will be able to:

1. Design and optimize sustainable chemical and biochemical production processes.
2. Integrate principles of biotechnology and chemical engineering for process innovation.
3. Apply research and analytical skills to address challenges in modern industries.
4. Collaborate internationally and cross-functionally in engineering projects.

5. Operate with professional and ethical responsibility in a global context.

4.3.2 Learning Outcomes

1. **Scientific Expertise and Technical Proficiency:** Graduates will acquire in-depth scientific knowledge and advanced technical skills, enabling them to critically assess and apply various process technologies in both chemical and biochemical contexts.
2. **Global, Economic, and Societal Impact:** Graduates will evaluate and identify the broader implications of chemical and biochemical processes, considering their effects on global, economic, societal, and environmental contexts.
3. **Interdisciplinary Competence in Process Technologies:** Graduates will identify, analyze, and compare different chemical and biochemical process technologies, integrating knowledge from multiple disciplines within engineering to address complex challenges.
4. **Business and Strategic Leadership:** Graduates will develop industry partnerships, based on business knowledge and strategic insight, drive innovation, and implement effective strategies for product development and organizational growth in the chemical and biochemical sectors.
5. **Adaptability to Industry Demands:** Graduates will apply their specialized knowledge to adapt to evolving labor market needs, positioning themselves as leaders in the development and application of cutting-edge technologies.
6. **Problem-Solving and Practical Application:** Graduates will identify key challenges within chemical and biochemical engineering, leveraging their academic and practical experiences to propose and implement effective solutions to real-world problems.
7. **Ethical Awareness and Professional Responsibility**: Graduates will demonstrate a strong commitment to high ethical and professional standards, ensuring responsible decision-making in their work.

4.3.3 Programme Structure

1. Duration: 2 years (4 semesters)
2. Credit Load: 120 ECTS, distributed across core modules, electives, mobility projects, and Master's thesis.
3. Language of Instruction: English
4. Mobility Pathways: Students will study in the three partner institutions and benefit from cross-cultural and interdisciplinary experiences.
5. Degree Awarded: Joint diploma, EQF level 7.

4.3.4 Target Group

The programme is open to holders of a Bachelor's degree (or equivalent) in one of the following fields:

- Chemical Engineering
- Biochemical Engineering
- Biotechnology / Biology
- Chemistry / Industrial Chemistry
- Environmental Engineering / Science
- Food Engineering / Science
- Pharmaceutical Sciences
- Biomedical Engineering

The programme seeks to target students from all across Europe and beyond, interested in combining an interdisciplinary specialisation with an international experience in three EU countries.

Applicants must demonstrate proficiency in English (minimum B2 level).

4.3.5 Career Prospects

Graduates will be prepared for positions in:

1. Chemical and biochemical industries
2. Pharmaceutical and biotech companies
3. Environmental technology firms
4. Research and development institutions
5. International consultancy and project management

4.4 Learning and teaching approach

4.4.1 Use of ECTS

This programme follows the ECTS Users' Guide (2015) with credit allocation based on learning outcomes and student workload. While workload hours per ECTS credit vary slightly across partners (TUIASI: 27h, UNIOVI: 25h, URN: 25-30h), all fall within the ECTS standard range of 25-30 hours and reflect different national conventions. This variation does not affect the achievement of learning outcomes or credit equivalence

4.4.2 Student centred approach

The consortium commits to the implementation of a student-centred approach that taps into the diversity of the student body and fosters Problem-based learning, teamwork and student autonomy.

The consortium will implement this student-centred approach through a range of initiatives:

1. **Active Learning Methods**:
   - Laboratory-based inquiry learning
   - Team projects and collaborative assignments
2. **Student Choice and Autonomy**:
   - Flexibility in thesis topic selection
   - Choice of internship placement
3. **Addressing Diversity**:
   - **Support to intercultural learning:** through the induction weeks, buddy systems, and other support measures explained in section 8
   - **Disciplinary diversity**: Bridging modules for students from biology vs chemistry backgrounds
   - **Cultural diversity**: Intercultural communication workshops, acknowledgment of different academic traditions
   - **Language support**: Beyond B2 English requirement, scientific English is included as a course in the curriculum, and will be encouraged to learn the local languages of the partner institutions

4.4.3 Online, Blended Mode and Digital Learning Policy

The CBPT Master's program will be delivered through a blended learning approach, combining both online and face-to-face elements. Online activities, including lectures, seminars, will account for no more than 60% of the total course time to ensure sufficient face-to-face interaction and hands-on learning. All laboratory, project and practical sessions will be conducted exclusively in person to provide students with direct, hands-on experience essential for mastering CBPT techniques. This approach aims to balance flexible, digital learning with the critical in-person practice needed for professional competence in the field.

The modules offered in CBPT are based on a methodology that combines face-to-face activities (lectures, seminars, laboratory and projects) with student individual and group activities (tasks, problem solving, preparation of reports, etc.). Since the attendance in person to laboratory and project activities is compulsory, these modules cannot be enrolled as only on-line learning mode.

4.5 Assessment schedule

The assessment framework for the *Joint Master's Programme in Chemical and Biochemical Process Technology (CBPT)* is designed to ensure academic coherence, transparency, and fairness across the three partner institutions: TUIASI, URN, and UNIOVI. All assessments are aligned with the programme's intended learning outcomes and follow the European Credit Transfer and Accumulation System (ECTS).

Assessments are scheduled at the end of each semester. The formal assessment periods take place in January - February for the winter semester (Semesters I and III) and in May - June for the spring semester (Semesters II and IV). Each institution may also provide a resit or retake session, held in July (UNIOVI), TUIASI, URN, in accordance with its academic calendar. At TUIASI and UNIOVI, the exact academic calendar is determined annually by decision of the University Senate and is published prior to the start of the academic year.

A diverse range of assessment methods is used to reflect the interdisciplinary and applied nature of the programme. These include written examinations, oral presentations, laboratory reports, project work, essays, and group assignments. Each module outlines specific assessment methods and grading criteria in its corresponding module descriptor. The final semester (Semester IV) is dedicated to the Master's thesis, which includes an oral defence.

Each module is coordinated by academic staff from the institution delivering it, who are responsible for preparing, administering, and grading the assessments. The Joint Programme Committee ensures that assessment standards remain consistent and academically rigorous across all delivery sites.

While each university applies its own national grading scale, a common conversion table will be used to map local grades to the ECTS grading scale.

Table: Grading Scales of the Consortium Partners

ECTS	FX, F, Fail	E, Sufficient	D, Satisfactory	C, Good	C, Good	B, Very good	A, Excellent
TUIASI	1-4	5	6	7	8	9	10
UNIOVI	<5, Suspenso	5-5.49 Aprobado	5.5-6.49, Aprobado	6.5-7.49, Notable	7.5-8.49 Notable	8.5-9.49, Sobresaliente Excellent	9.5-10, Matricula de Honor
URN	Insuffisant <10	Passable (10-10.49)	Passable, (10.5-10.99)	Assez bien (11-11.49)	Assez bien (11.5-12.49)	Bien (12.5-14.49)	Très bien (14.5-20)

This ensures transparency and facilitates the recognition of results across institutions. All modules are assigned ECTS credits, and students must successfully complete modules totalling 120 ECTS over the duration of the two-year programme.

In the final semester, students are required to complete and defend a Master's thesis. The thesis is supervised by academic staff, the supervisor of the Master thesis must be lecturer of the Master. Additionally, one co-supervisor is possible, for example, other lecturer, researcher, engineer from a company, etc. The thesis is evaluated by a joint examination board with representatives from all three universities. The total number of members of the examination board should be a minimum of 3 members (one member from each partner University to ensure a homogenous evaluation of the students, some of the members can participate on-line in the presentation).

The student should present and defend the Master's thesis in person at one of the Universities (preferably the University where the Master thesis work was done, but not limited to); on-line presentation should be limited to only special situations (problems with VISA and similar). The evaluation criteria include scientific quality, methodology, critical thinking, and communication skills. The thesis defence may be conducted in person.

Students will receive timely and constructive feedback on all assessments. Reassessment opportunities will be offered in line with the policies of the institution where the module was delivered, with oversight by the Joint Academic Committee to ensure that academic standards and fairness are upheld across the consortium.

4.6 Course Schedule (Schedule of modules)

The *Joint Master's Programme in Chemical and Biochemical Process Technology (CBPT)* is structured over four semesters (two academic years) and comprises a total of **120 ECTS credits**. The curriculum is designed to balance theoretical knowledge with applied, laboratory-based and project-oriented learning, while also supporting international mobility and specialization. Courses are delivered across the three partner institutions: TUIASI, URN, and UNIOVI.

A semester is 14 weeks.

4.6.1 Semester I – TUIASI:

Table: Semester I TUIASI

Course title	**Didactic hours, hour/week**				**ECTS**
	Course	**Sem**	**Lab**	**Project**	
Fermentation based biomanufacturing	2		2		5
Bioprocesses	2		2		3
Bioinformatic & Bioanalysis	1			1	5
Instrumental analysis of biomolecules	2		2		4
Scientific research/Engineering project in Biochemical Engineering	1	1	2		3
Ethics	1	1			5
Opt. 1. Project creation 2. Management and communication in industry	1			1	3
Opt. 1. Scientific English 2. Industrial Conferences		2		1	2

Co-funded by the European Union

4.6.2 Semester II - University of Oviedo - UNIOVI (Spain)

Table: Semester II UNIOVI

Course title	**Didactic hours, hour/week**				**ECTS**
	Course	**Seminar**	**Lab**	**Project**	
Analysis and Synthesis of Chemical Processes	1.5	0.5		0.5	4.5
Safety and Hazard Analysis	1.8	0.7			4.5
Research and Innovation Management	1			0.6	3
Pollution Prevention and Sustainable Technologies	1.5			1	4.5
Advanced Pollution Control Technologies	1.3	0.5	0.7		4.5
Emulsion and Suspension Technology	1.3	0.5	0.7		4.5
Seminars on Circular Economy		2.5			4.5

4.6.2 Semester III: University of Rouen -Normandy (France)

Table: Semester III URN

Course title	**Activities, hour/week**				**ECTS**
	Course	**Sem**	**Lab**	**Project**	
Microbial ecology for biotechnology (M1 Microbio SBI)	1	1			4
Pathogens and anti-infective strategies for biotechnology (M1 Microbio SBI)	1.5	1.5			4
Technology, innovation and Industrial Microbiology (M2 Microbio SBI)	1.5				4
Engineering project: Identify challenges and approaches in applied Microbiology to health and environment issues	2		2		4

(Network of affiliated academic laboratories specialized in microbiology)					
Surfaces coating and décontamination (IS-IQBIO)	1.5	1.5			4
Material-product compatibility and biological risk (IS-IQBIO)	3	3			6
Biological and Sterile Medicinal Products: industrial context and implementation (ESITech)	1.5	1.5			4

4.7 Academic Calendar

4.7.1 TUIASI

At TUIASI, the academic year 2025–2026 is structured in two main semesters and includes clearly defined teaching, examination, and holiday periods. The calendar is established annually by decision of the University Senate and is published prior to the start of the academic year. All national legal and religious holidays are observed.

Academic Calendar

Date	Period	Activity
22.09.2025 – 29.09.2025	7 days	Accommodation of students
29 September, 10:00–12:00	–	The Official Opening of the Academic Year

First Semester

Date	Period	Activity
29.09.2025 – 19.12.2025	12 weeks	Didactic Activity
20.12.2025 – 04.01.2026	2 weeks	Christmas Holiday
05.01.2026 – 18.01.2026	2 weeks	Didactic Activity
19.01.2026 – 08.02.2026	3 weeks	Examination Period
09.02.2026 – 15.02.2026	1 week	Winter Holiday

The Second Semester

Date	Period	Activity
16.02.2026 – 19.04.2026	8 weeks	Didactic Activity
10.04.2026 – 19.04.2026	1 week	Easter Holiday

Date	Period	Activity
14.04.2026	–	Free Days for Students, to be recovered on Saturday 09.05.2026
20.04.2026 – 31.05.2026	6 weeks	Didactic Activity
01.06.2026 – 21.06.2026	3 weeks	Examination Period
01.09.2026 – 13.09.2026	2 weeks	Re-examination Period
14.09.2026 – 15.09.2026	2 days	Re-examination

Second Semester for Final Years of Study (Bachelor and Masters)

Date	Period	Activity
16.02.2026 – 31.05.2026	14+ weeks	Didactic Activity and The Easter Holiday According To The Previous Calendar
01.06.2026 – 14.06.2026	2 weeks	Examination Period
15.06.2026 – 18.06.2026	4 days	Re-examination Period
23.06.2026 – 05.07.2026	14 days	Period for preparing the final thesis

---

Legal and Religious Holidays

- 30 November 2025
- 01, 25, 26 December 2025
- 01, 02 January 2026
- 6, 7, 24 January 2026
- 10, 13 April 2026

- 01 May 2026
- 01 June 2026
- 15 August 2026

4.7.2 UNIOVI

At UNIOVI, the academic year 2025–2026 is structured in two main semesters and includes clearly defined teaching, examination, and holiday periods. The calendar is established annually by decision of the University Senate. If needed, this calendar can be modified for Master's degrees with the authorisation of the Vice-rectorate with competences in academic organization.

First semester	**Duration (weeks)**	**Start**	**End**	**Comments**
Teaching period	14	09/09/2025	12/12/2025	
Evaluation period	3	15/12/2025	19/01/2026	Christmas holidays: from 24th December to 7th January
Second semester	Duration (weeks)	Start	End	
Teaching period	14	20/01/2026	30/04/2026	Easten holidays: from 30th march to 3rd April.
Evaluation period	3	04/05/2026	22/05/2026	
Presentation of thesis	6	04/05/2026	12/06/2026	
Final extraordinary evaluation	Duration (weeks)	Start	End	
Evaluation period	3	08/06/2026	26/06/2026	
Presentation of thesis	6	15/06/2026	24/07/2026	

Holidays: 8 and 21 September, 12 October, 1 and 24 November, 6 and 8 December, 26 January, 1 May.

Christmas holidays: from 24th December to 7th January.

Easten holidays: from 30th march to 3rd April.

4.7.3 URN

Third semester	**Duration (weeks)**	**Start**	**End**	**Comments**
Teaching period	14	06/09/2027	14/12/2027	
Evaluation period	1	15/12/2027	23/12/2027	Christmas holidays: from 24th December to 7th January
Fourth semester	Duration (weeks)	Start	End	
Internship (academic lab or company)	20 at least or 700h/per semester max 6 months	From 3/01/2028 (depending of Internship agreement)	15/07/2028	
Final extraordinary evaluation	Duration (weeks)	Start	End	
Internship report submitted	At least 2 weeks before the presentation	19/06/2028	26/06/2028	
Presentation of thesis	1	3/07/2028	7/07/2028	Depending to the disponibility of the jury members (from the 3 universities)

4.7 Module Descriptors

The module descriptors of the three semesters are included as Annexes to this document.

4.8 Evaluation and examination

The evaluation and examination of students enrolled in the CBPT Joint Programme shall be conducted in accordance with the procedures and criteria defined in the module descriptor of each subject, as jointly agreed by the Partner Institutions. Each module descriptor specifies the evaluation criteria, evaluation methods, and weighting of components contributing to the final grade, ensuring transparency, fairness, and academic coherence across the consortium.

The evaluation methods are designed to reflect both the theoretical and practical dimensions of the learning process and to align with the learning outcomes established for each course unit. The percentage contribution of each component to the final grade is recommended to be proportional to the number of hours allocated to the respective type of activity (lecture, seminar, laboratory, or project work).

In accordance with the principles of the European Credit Transfer and Accumulation System (ECTS) and the general framework for Master's studies within the European Higher Education Area (EHEA), students are expected to obtain 30 ECTS per semester (60 ECTS per academic year) to ensure normal academic progression. In cases where a student does not pass certain modules, the partner institutions agree on this approach: each enrollment provides three opportunities to pass each course (the regular examination session, a resit session, and one additional attempt, as defined by institutional regulations). Progression to the following semester or academic year may be conditional upon the number of credits obtained: a minimum of 40 ECTS credits is required for promotion from Year 1 to Year 2. All outstanding credits must be completed before the Master's dissertation defense and graduation.

4.8. 1. Course (Lecture-Based Activities)

Type of Evaluation: Final Exam / Assessment

Evaluation Criteria: Completeness and correctness of knowledge; logical coherence, fluency, and strength of argumentation; analytical and interpretative skills; originality and creativity; degree of mastery of specialized terminology and communication skills; ability to apply acquired knowledge and problem-solving capacity.

Evaluation Methods: Systematic observation of student performance (e.g., individual or team assignments, reports, or case studies); formative assessment tests conducted during the semester; and summative assessment tests or final examinations conducted at the end of the course.

4.8.2. Laboratory Activities

Evaluation Criteria: Ability to work collaboratively and apply theoretical knowledge in practice across different contexts; analytical and interpretative capacity; originality and creativity in laboratory tasks.

Evaluation Methods: Completion of all laboratory sheets (with the possibility of making up one missed session); continuous assessment during laboratory work; and a final assessment test (laboratory colloquium).

4.8.3. Project Activities

Evaluation Criteria: Teamwork skills; ability to apply acquired knowledge in practical and multidisciplinary contexts; analytical ability, originality, and creativity in problem-solving and project design.

Evaluation Methods: Completion and submission of all project sheets and deliverables, accompanied by individual or group presentations where applicable.

4.8.4. Seminar Activities

Evaluation Criteria: Application of theoretical knowledge to practical cases; analytical and interpretative skills; originality and creativity in discussion and presentation.

Evaluation Methods: Active participation in seminar discussions and a final assessment test or equivalent formative task.

4.8.5. Final Grade and Passing Conditions

The final grade for each course shall be determined by aggregating the scores obtained from all evaluation components according to their predefined weights. Grades shall be awarded on a whole-number scale from 1 to 10 for TUIASI and UNIOVI and 1-20 for URN, with a grade of 5, and 10 respectively certifying that the student has achieved the minimum learning outcomes required for successful completion of the course and the corresponding award of study credits (ECTS).

All Partner Institutions agree to recognize the equivalence of grades and evaluation results within the framework of the Joint Programme, ensuring full academic recognition of student performance across institutions.

4.9 Academic documents and templates

The CBPT Joint Master Programme Consortium agrees that each partner university can use its own institutional templates, in ENGLISH.

All templates, whether joint or institutional, will be mutually recognized and accepted within the program framework. These templates facilitate clear communication, streamline documentation, and support efficient programme management. All

templates are regularly reviewed and updated by the Joint Programme Committee. The partners also commit to using any INGENIUM templates produced and validated by the Alliance.

Key templates include, but are not limited to:

1. **Module Descriptor Template** must at least defines the learning outcomes, content, credit allocation, teaching methods, and assessment criteria for each module.
2. **Assessment Paper Templates**: Provide a standardized format for preparing examinations, quizzes, and assignments, ensuring clarity and fairness in student evaluation.
3. **Feedback Forms**: Designed for collecting structured feedback from students, academics, and external stakeholders to support continuous programme improvement.
4. **Student Mobility Documents**: Include templates for mobility agreements, learning agreements, and recognition forms to support Erasmus and other exchange activities.

4.10 Design of the diploma

The design of the diploma has been agreed by the consortium partners in alignment with their national and institutional regulations.

The joint diploma incorporates the main mandatory elements from the three partner universities, as well as the INGENIUM logo.

The proposed diploma is included in an Annex.

Besides the diploma, students will also receive a Diploma Supplement, including a detailed description of the qualification awarded, including programme content, learning outcomes, and grading information, in compliance with the European Higher Education Area standards – Europass diploma supplement.

5. Due Diligence, risk management and risk mitigation

5.1 Financial risks and mitigation measures

The financial risks of the programme are low due to the anchoring in existing programmes of the partner universities. The programme is not dependent on tuition fees for its viability, since the main expense (associated teaching costs) is covered by institutional funds of the partner institutions.

The unique mobility cycle also ensures the viability of the programme, as all students will enrol at all partner institutions.

The implementation of the program is subject to confirmation by the relevant specialized department.

The program will be operational with a minimum of **10** enrolled students. A smaller number would not threaten the implementation of the programme for enrolled students, although it could lead to a potential discontinuation if the number of students does not increase in future editions.

The scholarship model is envisaged as a pilot for the first cohort, with the intention of consolidating it in future editions. The programme is fully viable without this scholarship model, and it will still remain inclusive due to the very low tuition fees and the availability of other scholarship sources.

5.2 Legal risks and mitigation measures

This agreement is signed for an initial period of two (2) years. It will be automatically extended to a total duration of five (5) years, provided that all partner universities maintain their institutional accreditation and remain legally authorized to deliver joint degree programs. This timeframe has been designed to comply with the accreditation cycles of the three partner universities. However, the commitment of the partner is to maintain the programme for the whole duration of the 6-year cycle of the accreditation period, and extend it beyond that.

Following this period, the agreement may be renewed for subsequent terms of five (5) years, subject to mutual agreement of all parties. The agreement will be subject to a formal review on an annual basis to assess its effectiveness, progress, and alignment with the objectives. Any necessary modifications or updates will be made based on the review findings.

In the event that one partner decides to withdraw from this agreement, a written notice of termination must be provided at least one (1) year prior to the intended termination date. The notice must include the reasons for withdrawal, and all parties will collaborate to ensure a smooth transition. In the event of a partner withdrawal, a transition plan will be implemented to ensure that all current students enrolled in joint programs have the opportunity to complete their studies (all assessments activities for enrolled students must be completed).

Also, all parties will make reasonable efforts to identify an alternative partner within the INGENIUM network, to continue the collaborative activities and ensure continuity of the program.

5.3 Operational and academic risks and mitigation measures

To ensure effective coordination of academic matters, a cross-consortium academic committee will be established, comprising representatives from all the partner institutions. This Joint Academic Committee will oversee academic standards, curricula alignment and other relevant academic activities to ensure consistency and quality. It will support the continuous enhancement of the program, ensuring that equivalent teaching standards are uphold throughout the whole learning journey of enrolled students.

The joint academic committee will be established between TUIASI, UNIOVI and URN, which will include administrative staff from all three partners (TUIASI - Internationalization Prorectorate, UNIOVI - Vicerrectorado de Internacionalización; URN - Direction des Relations Internationales et de la Coopération).

This committee will be responsible for overseeing the governance structure, monitoring and managing routine operations, and addressing any risks related to staff and student mobility. The committee will meet as necessary to ensure effective coordination and to address any operational challenges.

5.4 reputational risks

The partners involved in CBPT joint master program are committed to ensuring the proposed collaboration operates as intended by carefully planning all aspects of the programme. Clear and accurate information will be provided to manage student and host university expectations effectively. Adequate administrative and support staff will be in place, at both involved universities, to support these efforts. The partner universities undertake to deliver the programme as described, in full, at the specified cost, and to award the qualifications as advertised.

6. Formal Agreement Process

For TUIASI, the approval process involves a multi-step procedure: first, the department will review and endorse the proposal, followed by approval from the Faculty Council. Finally, the University Senate will provide the ultimate endorsement.

For UNIOVI, the approval process of new programs involves the department of Chemical and Environmental Engineering, the Faculty of Chemistry, the University Council, the Regional Asturian Government, and the Spanish Ministry of Universities.

For URN, the internal validation process involves approval by the Faculty Council, the Committee for Education and Student Life (*Commission de la formation et vie étudiante universitaire – CFVU*).

6.1 Alignment with Partner Standards, Systems and Practices

For TUIASI, UNIOVI and URN all academic processes are firmly established and verified in accordance with the European Standards and Guidelines for Quality Assurance (ESG).

For CBPT joint program, the INGENIUM Quality Assurance (QA) policy will be applied to ensure uniformity in academic standards and practices across the consortium.

The partner universities of the CBPT joint programme will ensure that all academic and operational aspects align with European standards and practices.

The key commitments are:

1. **The evaluation procedure should be equivalent at the 3 universities,** also for the master thesis. Evaluation commitments are described in the respective section.
2. The courses and the evaluation of the student competences will be carried out in English.
3. The evaluation of students along the way, for the subjects studied within each partner university, will be carried out in compliance with the conditions provided in the Module/Course Descriptor, according to the rules adopted within the educational institution. This includes adherence to award standards, grading systems, work per ECTS, delivery model, assessment regulations and practices, academic management structures, monitoring.
4. **The award of the diploma is contingent upon the successful completion** of all courses, passing all exams, and the preparation and defence of the dissertation thesis.
5. **The Master thesis (dissertation),** which forms a key component of the program, must demonstrate advanced scientific knowledge on the chosen topic, incorporating elements of originality in the development or solution of the research theme, as well as methods for scientific validation of the results.

5..1 **The dissertation topic will be defined by the supervising lecturer in collaboration** with the student by the end of the second semester of the first year, ensuring alignment with the Master's degree training program and the supervisor area of expertise.

5..2 **The recommended length for the dissertation thesis is between 40 and 80 pages**, using A4 format, Times New Roman font, size 12, with line spacing of 1 to 1.5. Dissertation

supervisors will be jointly responsible with the student for ensuring the originality of the content, and they must prepare and sign a report confirming this, before the student is registered for the final exam. T

5..3 he Master's thesis will be presented and evaluated at the University where the student has completed the fourth semester. It must be written in English and, optionally, it may include an abstract in Romanian, Spanish or French.

5..4 The Master's thesis will be presented orally to a committee formed by 3 members, lecturers of the Master, and then, the student will answer the questions raised by the members.

6. **All partner institutions must recognise the results obtained by the students.** ECTS grading system will be used to harmonize the interpretation of the records. Work per ECTS will be consistent with European norms, ensuring that students are provided with an appropriate workload and learning experience.
7. **Staff qualifications will meet the program's requirements** and delivery models will be harmonized to offer a high-quality educational experience.
8. **All partners will contribute to the preparation of promotional information, ensuring that all materials** are accurate and aligned with the programme's objectives. Additionally, the involved universities will actively participate in the registration and induction processes for both students and staff, ensuring that all participants are well-prepared for their roles in the program.
9. **Assessment regulations and practices will be aligned between the partner universities**, ensuring fairness and consistency. Academic management structures will participate in the program's monitoring and evaluation processes. Regular meetings will be documented to ensure transparency, and involved universities will actively contribute to program monitoring, feedback collection, and ongoing improvements, ensuring the program's success and compliance with quality standards.

7. Quality Assurance of the programme

7.1 Introduction

CBPT program is designed to meet the criteria established by the Romanian Agency for Quality Assurance in Higher Education (ARACIS), ensuring consistency with European higher education guidelines and methodologies. This chapter outlines the Quality Assurance (QA) Basis and QA Strategy for the entire assessment process, focusing on the standards for awarding degrees, learning outcomes, grading, assessment practices, and final decision-making processes. The joint contribution of TUIASI, UNIOVI and URN ensures that all institutions uphold and integrate these standards.

CBPT academic quality assurance will adhere to the INGENIUM QA Policy, including the Quality Assurance Framework for Collaborative Delivery of Degrees within the INGENIUM partnership, ensuring consistent standards and rigorous academic oversight across all partner institutions. This policy has been produced with the European Approach to the Quality Assurance of Joint Programmes as a reference.

7.2 Quality Assurance Basis

The commitment of all three universities involved: **TUIASI, UNIOVI and URN** to the CBPT program ensures the academic framework adheres to European standards and practices, as defined by ARACIS, ANECA and HCERES and the INGENIUM Alliance QA guidelines.

These standards include:

1. **Award Standards:** The Master's program will adhere to the European standards for higher education qualifications. TUIASI, UNIOVI and URN will ensure that graduates meet the required learning outcomes and competencies for a Master's degree.
2. **Learning Outcomes:** The learning outcomes of the CBPT program are designed to ensure that graduates acquire a well-rounded education in chemical and biochemical process technologies, focusing on scientific knowledge, technical expertise, and interdisciplinary understanding. The specific learning outcomes are as follows:
3. **Scientific Expertise and Technical Proficiency:** Graduates will acquire in-depth scientific knowledge and advanced technical skills, enabling them to critically assess and apply various process technologies in both chemical and biochemical contexts.
4. **Global, Economic, and Societal Impact:** Graduates will evaluate and identify the broader implications of chemical and biochemical processes, considering their effects on global, economic, and environmental contexts.
5. **Interdisciplinary Competence in Process Technologies:** Graduates will identify, analyze, and compare different chemical and biochemical process technologies, integrating knowledge from multiple disciplines within engineering to address complex challenges.
6. **Business and Strategic Leadership:** Graduates will develop industry partnerships, based on business knowledge and strategic insight, drive innovation, and implement effective strategies for product development and organizational growth in the chemical and biochemical sectors.

7. **Adaptability to Industry Demands:** Graduates will apply their specialized knowledge to adapt to evolving labor market needs, positioning themselves as leaders in the development and application of cutting-edge technologies.
8. **Problem-Solving and Practical Application:** Graduates will identify key challenges within chemical and biochemical engineering, leveraging their academic and practical experiences to propose and implement effective solutions to real-world problems.
9. **Ethical Awareness and Professional Responsibility:** Graduates will demonstrate a strong commitment to high ethical and professional standards, ensuring responsible decision-making in their work.
10. **Grading System:** The grading system will align with European and INGENIUM standards, ensuring consistency across partner institutions. The system will be transparent, objective, and provide students with clear feedback on their performance. The system is described in section 4.5
11. **Work per ECTS:** The program will ensure that the total workload is compliant with the European Credit Transfer and Accumulation System (ECTS), with the expected student workload corresponding to the program's credit requirements (60 ECTS per year). For TUIASI, 1 ECTS corresponds to 27 hours of activities (didactic, practical, evaluation + individual study). For UNIOVI, 1 ECTS consists of 25 h of activities, 7.5 h of them corresponds to face-to-face activities (lectures, seminars, laboratory and project sessions) and 17.5 h of them corresponds to unsupervised learning (individual study, team work, assessment preparation, etc.).
12. **Staff Qualifications:** All teaching staff involved in the delivery of the program, from **TUIASI, UNIOVI and URN**, and all associated partners will meet the required academic qualifications, with a focus on expertise in the fields of chemical engineering, biotechnology, and process technology.
13. **Delivery Model:** The CBPT Master's program will be delivered through a blended learning model, integrating both online and face-to-face components. The delivery method will ensure accessibility while maintaining high academic standards and promoting interactive and collaborative learning.
14. **Promotional Information:** Accurate and clear promotional materials will be provided, outlining the program's objectives, learning outcomes, admission requirements, and structure, ensuring transparency for potential applicants from both institutions.
15. **Registration and Induction:** The program will establish clear and effective registration procedures for students, supported by a comprehensive induction process for both students and staff. This induction will cover academic expectations, the use of learning resources, and practical aspects of program delivery across **TUIASI, UNIOVI, and URN**.

7.3 Quality Assurance Policy

The three consortium partners agree on a joint QA policy for the programme.

The **TUIASI, UNIOVI, and URN** QA policy for the CBPT Master's program will involve a structured approach to assessment and decision-making processes. The policy will be based on the following elements:

Assessment Regulations and Practices:

Assessments will be designed to evaluate both theoretical knowledge and practical skills. Assessments will include written exams, project work, laboratory reports, and presentations. The assessments will be designed to evaluate students' ability to apply their knowledge to real-world problems in chemical and biochemical process technology. Assessment criteria will be clearly outlined in the descriptor for each module or discipline, detailing the required standards for successful completion. Each module will specify the minimum grade necessary to pass the examination, ensuring transparency and consistency across the program.

The grading scale and the assessment methods, including any requirements for written, oral, or practical exams, will be communicated to students at the start of the module. The minimum passing grade will reflect the academic rigor and expectations of the program, ensuring that students meet the necessary standards for academic progression and the award of the postgraduate degree.

Continuous Monitoring and Feedback:

Throughout the program, students will receive continuous feedback on their progress, enabling them to improve and meet the required learning outcomes. Regular monitoring will ensure that the assessment methods are effective and that any necessary adjustments to the program can be made.

Academic Management Structures: TUIASI, UNIOVI, and URN, within the INGENIUM framework, will establish clear management structures to oversee the program's delivery, assessment, and evaluation processes (**Joint Academic Committee**).

Joint Academic Committee, having at least one responsible from each partner, will be established to oversee the management of CBPT Program, ensuring alignment with the institutions' academic goals and quality standards and it will be responsible for overseeing the day-to-day management, ensuring that all actions align with the agreed timeline and objectives.

This Joint Academic Committee will oversee academic standards, curricula alignment and other relevant academic activities to ensure consistency and quality. It will support the continuous enhancement of the program, ensuring that equivalent teaching standards are uphold throughout the whole learning journey of enrolled students. Joint Academic Committee will have regular meetings with the academic and administrative staff of both partner institutions to ensure alignment and continuous improvement of the program. This Committee will consist of representatives from all involved universities, including faculty permanent members, administrative staff *and student representatives*.

Final Examination and Thesis Assessment:

- The **award of the diploma** will depend on the successful completion of all required modules, passing all exams, and the preparation and defense of the dissertation thesis. The thesis is a key element of the program and must demonstrate advanced scientific knowledge of the chosen topic, incorporating originality in the development or solution of the research theme.
- **Dissertation Guidelines:** The dissertation is written in English. The dissertation must adhere to specific format guidelines, including a recommended length of 40-80 pages, in A4 format, with Times New Roman font, size 12, and line spacing of 1 to 1.5. The dissertation will be evaluated based on the depth of research, originality, and scientific rigor.
- **Supervision and Originality:** The dissertation will be supervised by a faculty member from either TUIASI, UNIOVI and URN, who will work closely with the student to define the research topic by the end of the second semester of the first year.
- **Continuous improvement:** The Quality Assurance (QA) process for continuous improvement will be developed and implemented jointly by the partner institutions. Student feedback will be systematically collected at the end of each semester through standardized surveys and/or structured interviews, focusing on course content, teaching quality, learning outcomes, and administrative aspects. This feedback will be analyzed by the Joint Academic Committee, and results will inform annual review meetings to assess and implement improvements to the program structure, teaching methods, and learning resources.

7.4 Decision Process for Making Awards

- **Final Decision on Awards:** The decision to award the Master's degree will be made based on the successful completion of all courses, passing all examinations, and the satisfactory defense of the dissertation thesis. The final decision will be made by a Final Examination Committee (FEC) composed of academics from TUIASI**,** UNIOVI, and URN, ensuring impartiality and consistency with the program's academic standards.
- **Award and Graduation:** Upon meeting all requirements, the student will be awarded the Master's degree, accompanied by a diploma in line with European standards and the INGENIUM Alliance's joint academic regulations. The diploma will be accompanied by a diploma supplement with details on the student's performance, including grades, ECTS credits earned, and the grade obtained for the dissertation.

7.5 Processes for Monitoring and Review

a. Process for Ongoing Monitoring

Regular meetings will be held biannually by the Joint Academic Committee between the partner universities to effectively monitor and assess the progress of the collaborative program. These meetings will provide a platform for reviewing the program's quality, addressing challenges, and ensuring continuous improvement. Every five years, prior to the

re-accreditation process (periodic evaluation), a comprehensive meeting will be convened to evaluate the program's performance and discuss the renewal or re-accreditation of the joint program. This meeting will ensure that the program remains aligned with the evolving academic standards, regulatory requirements, and strategic goals of the participating institutions.

b. Process for Periodic Review

CBPT periodic review will be conducted in accordance with the regulatory standards of the participating institutions, including ARACIS requirements. The periodic evaluation will involve the collection and analysis of feedback from key stakeholders, including current students, alumni, and employers, to ensure the program's continued relevance, quality, and alignment with industry needs. Specifically, the evaluation process will include the analysis of data related to the CBPT master's program, gathered from these groups, to assess student satisfaction, alumni career outcomes, and employer expectations. This feedback will inform decisions regarding program updates, improvements, and potential areas for development, ensuring that the program remains responsive to both academic standards and professional requirements.

c. Process for Review of Policies and Procedures

For the CBPT program, the partner universities will conduct a periodic review of the academic quality assurance policies and procedures at least every five years, or more frequently if there are significant changes in European standards or relevant accreditation requirements. This review process will ensure that the program remains aligned with evolving academic and regulatory expectations and that it continues to meet the highest standards of quality and relevance in the field. The review will involve an assessment of the program's structure, content, and delivery methods, with input from key stakeholders, to identify areas for improvement and ensure ongoing compliance with international best practices.

7.6 Quality Indicators and Data Collection

The following list of indicators will be collected annually and reviewed by the JAC.

This serves as a non-exhaustive, non-prescriptive list, which may be amended by the JAC depending on the feasibility of the data collection and the aligment with the partners´ existing data collection processes.

Quantitative Indicators:

1. Application and admission rates (overall and by country)
2. Student enrollment and retention rates
3. Completion rates and time-to-degree
4. Grade distributions by module and institution
5. Graduate employment rates (6 months, 1 year, 3 years post-graduation)

6. Graduate further studies rates
7. Employer satisfaction with graduates

Qualitative Indicators:

1. Student satisfaction (surveys each semester)
2. Student feedback on modules
3. Teaching evaluations
4. Alumni feedback and career progression
5. Employer feedback on graduate competences
6. External stakeholder input through the continous improvement committee

7.7 External Quality Assurance plan

This joint programme will undergo external quality assurance using the European Approach for Quality Assurance of Joint Programmes, coordinated through the Romanian Quality Assurance agency ARACIS.

8. Student rights, responsibilities and support systems

8.1 Code of Conduct (Student)

All consortium partners agree to follow the codes of conduct of the partner institutions, reflecting the core academic values and standards of behavior expected across Universidad de Oviedo, University of Rouen Normandy, and Gheorghe Asachi Technical University of Iasi.

Key expectations include maintaining honesty and integrity in all academic work (no cheating, falsification or plagiarism) treating all members of the university communities with respect and without discrimination, and fostering a positive, collaborative learning environment.

All students, academics, and staff involved in the CBPT programme are required to abide by the respective Codes of Conduct as a condition of participation. This means that a student must comply with the local code of conduct and regulations of whichever university they are attending at a given time, as well as the consortium's overarching principles.

By embracing these ideals, the programme ensures a safe, fair, and inclusive academic environment across all three campuses. Any form of harassment, discrimination, or academic misconduct will not be tolerated, and will be addressed under the agreed disciplinary procedures (see below).

The key principles of this shared Code of Conduct, based on the existing codes of conduct of the partner institutions, will be published in the Consortium Student Handbook and each student will sign a statement of adherence upon enrolment.

The partners also commit to the creation of a Joint Code of Conduct (JCC) once the JAC student representatives are elected. The JCC will be approved within the first 6 months of implementation of the programme and reviewed annually.

This joint Code of Conduct should be built on principles of academic integrity, respect, inclusivity, and professionalism, as well as the rejection of any type of discrimination. It should be fully aligned with the existing ethical codes and student charters at each institution, ensuring compatibility with local norms while upholding common standards for the entire programme community.

8.2 Student Disciplinary Policy and Procedures

The consortium establishes a unified framework for student disciplinary policy, coordinated across the three partner universities. This framework respects the existing disciplinary regulations at UNIOVI, URN, and TUIASI, while ensuring that misconduct is addressed consistently at the consortium level.

Any alleged breach of the Code of Conduct or other rules will initially be dealt with according to the procedures of the university where the incident occurs or is discovered. For example, each institution's competent bodies (such as UNIOVI's student discipline committee and equivalent offices at URN and TUIASI) will carry out fact-finding and first-instance decisions under their local rules. At the same time, the partners will inform the programme's Joint Academic Committee of any serious disciplinary cases.

The Joint Academic Committee will oversee cases that affect the consortium as a whole or involve misconduct across multiple campuses. This committee will ensure that sanctions are proportionate and equitable across the consortium, and that repeat offenses at different universities are not treated in isolation.

Disciplinary measures may range (depending on severity) from warnings and mandatory training (for minor infractions) up to suspension or expulsion from the programme for grave misconduct, in line with each institution's regulations and national law.

In all cases, the student rights to due process will be upheld:

1. The student will be informed of the allegations, given an opportunity to respond, and allowed to appeal decisions.
2. Appeals will follow the relevant partner's appeal procedure, but the Joint Academic Committee may advise on appeals to promote consistency.
3. The consortium's approach is in keeping with European joint programme best practices, ensuring both local accountability and joint oversight. Notably, students are expected to observe the disciplinary codes of their host university at each mobility and must refrain from any fraudulent or unethical behavior such as plagiarism or cheating.

By coordinating our disciplinary processes, we aim to maintain high academic standards and protect the programme's integrity across all partners.

8. 3 Grievance Policy and Procedure (Student)

The three partner universities agree to a common Grievance Policy to handle student complaints and problems in a fair and transparent manner. This policy covers any academic or administrative grievance a student might have during the programme – for example, concerns about course delivery, supervision, assessment, or services in the joint programme. The consortium's grievance procedure is designed to be compatible with each institution's existing complaint mechanisms while providing a clear escalation path across the consortium.

In practice, a student should first attempt to resolve a complaint at the local level by communicating with the local coordinator of the programme in each of the partner universities. A student may also decide to communicate the issue to one of the student representatives of the programme, who will then communicate it to the local coordinator.

This follows the principle that complaints should be addressed at the immediate level of concern whenever possible. If the issue is not satisfactorily resolved locally, or if it pertains to the joint programme structure rather than a single institution, the student may escalate the grievance to the consortium level.

The Joint Academic Committee will address any grievance brought by a student. An ad-hoc meeting may be called by any of the members of the JAC whenever a complaint is made. This body will review escalated complaints objectively and seek a solution in line with INGENIUM principles.

At the beginning of the programme and each semester, students will receive guidance on how to submit a formal complaint. Information on the formal complaint procedure (contacts,

forms, and timelines) will be published on the programme's section within the INGENIUM website.

All grievances will be handled confidentially and without fear of reprisal. Decisions on complaints will be communicated in writing and, if the student remains dissatisfied, they retain the right to appeal further in accordance with the applicable university's rules.

By coordinating our grievance procedures, the consortium guarantees that students have a clear, effective way to voice concerns and receive resolutions, no matter which campus they are on at the time.

8.4 Reasonable Academic Accommodation Policy for students

The consortium is committed to ensuring inclusive and equitable access to the programme for students with disabilities, learning difficulties, or other special needs. We jointly adopt a Reasonable Academic Accommodation Policy that aligns with the best practices and legal requirements in Spain, France, and Romania, as well as with European higher education inclusivity guidelines*.

Under this policy, any enrolled student who has a documented disability or specific educational need is entitled to appropriate accommodations across all partner institutions.

These accommodations may include, but are not limited to:

- modified assessment conditions (e.g. extra time on exams),
- accessible learning materials, assistive technologies,
- permission for support aids,
- adjusted course attendance requirements, or
- physical accessibility arrangements.

Each university in the consortium has established services and offices to support students with special needs :

1. UNIOVI: the University of Oviedo's Office for Students with Specific Needs (ONEO) provides personalized support to facilitate the inclusion and full participation of students with disabilities in academic and campus life
2. URN Mission Handicap center provides support to students with disabilities and special needs
3. TUIASI Students Counselling Center.

The partners will coordinate these services to ensure that when a student moves from one university to another for mobility, their accommodations travel with them.

Before or upon enrollment, students with disabilities requiring accommodations should inform the programme coordinators or the designated disability office at their home institution, providing any necessary documentation (e.g. medical certificates).

The consortium's Joint Academic Committee will then work with the local disability support officers at each university to develop an accommodation plan that is recognized by all partners.

All academic and administrative staff involved in the programme will be made aware of their obligations under this policy and given guidance on how to implement accommodations in coursework and assessment. The policy emphasizes a proactive and individualized approach: we strive to anticipate potential barriers and meet students' needs through reasonable adjustments, in line with the inclusive ethos of INGENIUM.

There will be no academic penalty for students using approved accommodations – for instance, if a student is granted additional exam time or assignment extensions, all consortium members will honor these measures. The confidentiality of students' disability-related information will be maintained, sharing details only as necessary with relevant staff and compliance with GDPR. By formalizing this Reasonable Accommodation Policy in the consortium agreement, the three universities affirm their shared commitment to diversity and equal opportunity, ensuring that no student is disadvantaged due to disability or health conditions.

8.5 General and Partner-Specific Policy and Procedures for Recognition of Prior Learning

The Recognition of Prior Learning- finalized with a bachelor diploma (RPL) may be utilized as a pathway for admitting learners to CBPT programme, enabling the acknowledgment of relevant learning and experiences gained outside the formal education system.

The purposed master program is intended for Bachelor's degree in chemical engineering or a closely related field**,** Bachelor's degree in chemistry, food engineering, Bachelor's degree in biotechnology, biochemistry, biology, biophysics, or related fields such as bioengineering or biochemistry, biochemical engineering graduates, graduates with Interdisciplinary Backgrounds (graduates in related interdisciplinary fields, such as environmental engineering, environmental science, or material science, who have studied fundamental chemical and biological principles and are interested in applying them to process technologies), professionals in related industries (working professionals with a background in chemical, biochemical, or environmental industries who wish to advance their expertise in process technology and gain specialized knowledge in chemical and biochemical process design and optimization), individuals with relevant research experience (candidates with research experience in chemistry, chemical engineering, biotechnology, or related areas who are looking to further their academic qualifications and specialize in process technology). CBPT will attract students interested in the design, modeling, operation, and analysis of production systems and process technologies in Chemical and Biochemical Processes.

Students may request Recognition of Prior Learning to the JAC or the adequate bodies of the partner institutions. The process shall be done in full alignment with the Lisbon Recognition Convention and the ECTS Users´ Guide.

RPL requests should comply with the following Maximum Recognition Ceilings aligned with the partner institutions´ frameworks.

Table: RPL ceilings

Category	**Maximum**	**Rationale**
Overall Program	30 ECTS (25% of 120)	Ensures 90 ECTS CBPT-specific content
Per Semester	15 ECTS (50% per semester)	Ensures participation at each location
Prior Certificated Learning (RPCL)	20 ECTS	From Bachelor or Master degrees
Prior Experiential Learning (RPEL)	10 ECTS	From work/research experience
Professional Certifications	6 ECTS	Process safety, environmental, etc

8.6 Provision of student accommodation

The Partner Universities agree to make reasonable efforts to provide academic accommodations to all students enrolled in the CBPT Master's Programme. Each Partner University shall follow its own established procedures for granting accommodations, including adjustments to schedules, access to campus facilities, resources, and assessment arrangements, as appropriate.

The Partner Universities shall cooperate to ensure that accommodations are implemented fairly and consistently.

8.7 Mobility support mechanisms and measures

All the student support mechanisms provided by the three partner universities and the INGENIUM European University will be incorporated into the student handbook to be distributed among all students upon enrollment.

8.7.1 Pre-Arrival Support

Before the start of each semester, students will be offered the following support measures:

1. **Buddy System**: students will be offered the possibility to enroll in Buddy Systems implemented by the partner universities in collaboration with local student associations (such as the Erasmus Student Network)
2. **Pre-arrival Communication**:
    - Virtual orientation session
    - Pre-arrival checklist and Student Handbook
3. **Practical Information**:
    - Accommodation search assistance in line with institutional policies
    - Visa guidance and support letters for non-EU students who need them
    - Support with travel arrangements and arrival logistics

8.7.2 Upon-Arrival Support

1. **Induction Week**: Mandatory orientation at each institution before semester starts, including:
    - Campus tours and facility introduction
    - IT systems training (email, LMS, library)
    - Academic expectations and study culture
    - Local area orientation (transport, shops, emergency services)
    - Team-building and social activities
2. **Administrative Support**:
    - Registration procedures
    - Residence permits
    - Health insurance activation
    - Student ID and access cards

3. **Meeting Key People**:
    - Local programme coordinator
    - Teachin and administrative staff
    - Support services (counseling, disability, international office)

8.7.3 Ongoing Support Throughout Programme

Besides the targeted mobility support related to the frequent changes in location, the partners are also committed to the provision of comprehensive support through their existing offices and the structures of the INGENIUM European Universities Alliance.

1. **Academic Support**:
    - Tutoring and mentoring
    - Potential Academic skills workshops (scientific writing, presentation skills, research methods)
    - Library and information literacy training
    - Support for students struggling academically
2. **Personal Wellbeing**:
    - Mental health counseling services at each location
    - Support for culture shock and adjustment
    - Peer support networks
    - Crisis support and emergency contacts
    - Confidential advice on personal issues
3. **Career Development**:
    - Career counseling and planning
    - CV and interview preparation
    - Internship coordination in Semester 4
    - Employer networking events
    - Professional network building
    - Job placement support and employer connections
4. **Inclusion, Diversity and Multilingualism**

- Accessibility accommodations across all locations
- Support for students with mental health conditions
- Cultural and personal accommodation
- Family support if applicable
- Language learning support in coordination with INGENIUM language centres

5. **Sustainable and healthy habits**
   - Support to acquire sustainable lifestyle
   - Advice on sustainable local (and potentially international) travel, cooperation with rail providers
   - Access to sport facilities

9. Revisions and modifications to the Cooperation Agreement

The partners may decide to revise this Cooperation Agreement to improve the implementation of the programme.

Minor revisions that do no alter the fundamental academic, financial, or legal aspects of the programme may be agreed within the JAC.

Comprehensive revisions should be approved by all partners following the institutional processes of the partner institutions.

The recommendations made by the Quality Assurance Agency responsible for the external evaluation of the programme should be considered as an Annex to this Cooperation Agreement.

Signatures

TUIASI	UNIOVI	URN
Rector,	**Rector,**	**President,**
Prof. Dan Cascaval	**Prof. Ignacio Villaverde Menéndez**	**Prof. Franck Lederf**

List of Annexes

Annexes are provided as separate documents and included in the programme folder.

All documents shall be made available to the Quality Assurance Agency and any relevant authority involved in the accreditation of the programme.

Annex I: Model diploma

Annex II: Module descriptors – TUIASI

Annex III: Module descriptors – UNIOVI

Annex IV: Module descriptors – URN

Annex V: Design process of the Joint Programme

Annex VI: GDPR Agreement

Annex VII: IP Agreement

Annex VIII: TUIASI Admission Regulations

Complementary documents (CDs)

Documents that the consortium commits to create as part of the implementation of this Cooperation Agreement.

The documents will be made available upon request to the Quality Assurance and Accreditation Agencies, the review panel responsible for the evaluation of the programme, or any relevant authority.

CD1: Student Handbook

CD2: Staff CVs

CD3: List of partner facilities and services available

CD4: Complete partner policies and procedures

CD5: Complete Recognition of Prior Learning Policy

Joint Master's Program in Chemical and Biochemical Process Technology

MASTER
acordată de cele trei universități partenere: Universitatea Tehnică „Gheorghe Asachi" din Iași (România), Universitatea din Oviedo (Spania) și Universitatea din Rouen Normandia (Franța).

MÁSTER
expedido en colaboración internacional por la Universidad Técnica "Gheorghe Asachi" de Iași (Rumanía), junto con la Universidad de Oviedo (España) y la Universidad de Rouen Normandía (Francia).

MASTER
délivré en partenariat international par l'Université Technique "Gheorghe Asachi" of Iasi (Roumanie) avec l'Université d'Oviedo (Espagne) et l'Université de Rouen Normandie (France).

ROMÂNIA

MINISTERUL EDUCAȚIEI ȘI CERCETĂRII

În baza absolvirii Ciclului II – Studii universitare de masterat și a promovării examenului de finalizare a studiilor din sesiunea..... la propunerea Facultății de Inginerie Chimică și Protecția Mediului "Cristofor Simionescu", Universitatea Tehnica Gheorghe Asachi din Iasi,

conferă

…… născut în anul ..... luna ..... ziua .....absolvent a Universității Tehnice „Gheorghe Asachi" din Iași (România), Universității din Oviedo (Spania) și Universității din Rouen Normandia (Franța).

titlul de MASTER

în domeniul de studii Inginerie chimică programul de studii TEHNOLOGIA PROCESELOR CHIMICE ȘI BIOCHIMICE (CHEMICAL AND BIOCHEMICAL PROCESS TECHNOLOGY), forma de învățământ cu frecvență, studii integrate, durata studiilor 2 ani, numărul de credite de studii transferabile (ECTS) 120

Titularul diplomei beneficiază de toate drepturile legale.

Rector,

Secretar sef,

Nr. ..... din .....

Semnătura titularului .....

ESPAÑA

FELIPE VI, REY DE ESPAÑA

y en su nombre
el/la Rector/a de la UNIVERSIDAD DE OVIEDO

Considerando que, conforme a las disposiciones y circunstancias previstas por la legislación vigente,

Don/Doña ……

nacido/a el DD de MES de AAAA en ……., de nacionalidad ……,

ha superado en modalidad presencial en MES de AAAA, los estudios conducentes al TÍTULO CONJUNTO oficial de MÁSTER UNIVERSITARIO en

TECNOLOGÍA DE PROCESOS QUÍMICOS Y BIOQUÍMICOS

por la Universidad Técnica "Gheorghe Asachi" de Iași (Rumanía), la Universidad de Oviedo (España) y
la Universidad de Rouen Normandía (Francia),

establecido por Acuerdo de Consejo de Ministros de DD de MES de AAAA expide el presente título oficial con validez en todo el territorio nacional, que faculta a el/la interesado/a para disfrutar los derechos que a este título otorgan las disposiciones vigentes.

Dado en …….. a … de ……. de …..

El/La interesado/a, El/La Rector/a, Los/as Rectores/as,

El/La Jefe/a de la Secretaría,

Número de registro

RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE

Vu le Code de l'éducation, notamment son article L. 613-1 ;
Vu les textes réglementaires autorisant l'université de Rouen Normandie à délivrer le diplôme ;
Vu l'arrêté du 27 juin 2022 accréditant l'Université de Rouen Normandie en vue de la délivrance de diplômes nationaux ;
Vu les procès-verbaux du jury ;
Le diplôme national de Master de SCIENCES, TECHNOLOGIES, SANTE, mention **INGENIERIE DE LA SANTE**, **Parcours type TECHNOLOGIE DES PROCEDES CHIMIQUES ET BIOCHIMIQUES** est délivré à (Mme ou M) (prénom, NOM patronymique), date de naissance le ……..à ……..

au titre de l'année universitaire.....et confère le **grade de Master,** pour en jouir avec les droits et prérogatives qui y sont attachés.

Fait le …..

Signature du chef d'établissement

Le recteur de la région académique
Chancelier des universités

Numéro du diplôme

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Fermentation based biomanufacturing**			
2.1.2 Course code				501	2.1.3. Course category Fundamental/Specialized/Complementary)		DS
2.2 Course instructor				Associate professor Alexandra Blaga			
2.3 Course instructors for applied activities (S, L, P, Pr)				Associate professor Alexandra Blaga			
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	4	3.2 course	2	3.3a sem.	0	3.3b laboratory	2	3.3c project	0	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	56	3.5 course	28	3.6a sem.	0	3.6b laboratory	28	3.6c project	0			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Study in library and practical skills development	26
Preparation of seminars / laboratory works / project phases / home works / presentations	20
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	76
3.8 Total hours per semestre[10]	135
3.9 Number of credits	5

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used. Students must attend the course with their mobile phones turned off.
5.2 Laboratory requirements[13]	Students must enter the laboratory with their mobile phones turned off. During laboratory work, students must wear lab coats and protective equipment appropriate for handling microorganisms. Students must come to the laboratory with written reports on the experiments to be carried out, already studied and understood. Students are not allowed to leave operating equipment unattended. Bringing food into the laboratory is strictly prohibited. Attendance at laboratory sessions is mandatory. Any accident or incident must be reported immediately to the lab supervisor. Unauthorized handling of microorganisms and equipment is strictly forbidden.

6. Overall objective of the course

The course aims to provide students with a foundational understanding of industrial fermentation and biomanufacturing processes, with a strong emphasis on microbial physiology, metabolic regulation, and reactor engineering. Students will gain

advanced insights into the design, operation, and optimization of fermentation systems used in the sustainable production of industrial products, including cells, enzymes, therapeutics -antibiotics, and bulk chemicals – organic acids, aminoacids.

7. Learning outcomes

Knowledge	The student / graduate: - describes the role of microbial fermentation, microbial biocatalysis, and enzymatic biocatalysis in the sustainable manufacture of industrial products, including cells, proteins, and chemicals. - explains the physiological and metabolic characteristics of industrial microorganisms used in fermentation-based biomanufacturing. - recognizes the specific stress conditions associated with the production of various bioproducts and how these impact microbial performance. - classifies industrial bioreactor types and their operating modes (batch, fed-batch, continuous), including key control parameters and monitoring strategies. - outlines the biochemical and process-based foundations of biofuel and biogas production from renewable substrates. - summarizes the technological steps and microbial pathways involved in the fermentative production of antibiotics, organic acids, amino acids, enzymes, and vitamins.
Skills	The student / graduate: - determine how different product types (bulk chemicals, fine chemicals, bulk protein, refined proteins, or live cells) affect the choice of the fermentation process and downstream processing, as well as the possible stress factors. - analyse the consistency of experimental data using simple models - critically evaluate the feasibility of fermentation, microbial biocatalytic and enzymatic processes in an industrial context and devise a research/development plan - evaluate different fermentation processes (batch, fed-batch, continuous etc.) and their benefits and drawbacks in relation to delivering a uniform growth environment - create solutions for specific problems in industrial fermentation and defend or modify the solutions
Responsibility and autonomy	The student / graduate: - respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; - assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; - engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Microorganism used in biomanufacturing. Microbial physiology and metabolism in fermentation processes. Product specific stress (e.g. enzymes, protein therapeutics, biofuels, bulk chemicals, and secondary metabolites).	Interactive lecture Guided discussions Clarifying explanations	4 hours
9.1.2. Role of fermentation and biocatalysis in the sustainable manufacture of industrial products (including cells, proteins and chemicals)		2 hours
9.1.3. Reactor designs. Operating modes of fermentation reactors. Basic bioreactor control concepts. On-line process control. Scale-Up and Scale-Down Strategies in Industrial Fermentation		4 hours
9.1.4. Production of biofuels and biogas.		4 hours
9.1.5. Technologies for bio-production of antibiotics		4 hours

9.1.6. Technologies for bio-production of organic acids and amino-acids		4 hours
9.1.7. Technologies for bio-production of enzymes and vitamins		4 hours
9.1.8. Technologies for vaccine production		2 hours

Course bibliography:

1. Shah, M.P. & Vyas, B.R.M. (eds.) (2023). Emerging Technologies in Applied and Environmental Microbiology, 1st ed. Academic Press. ISBN: 9780323998956 (print), 9780323911436 (eBook).
2. Shijie Liu – Bioprocess Engineering, Kinetics, Sustainability, and Reactor Design, second edition, Elsevier, Radarweg 29, PO Box 211, 1000 AE Amsterdam, Netherlands, 2017
3. J. Smith – Biotechnology, Fifth edition, Cambridge University Press, The Edinburgh Building, Cambridge CB2 8RU, UK, 2009
4. Najafpour-Darzi, G. Biochemical Engineering and Biotechnology (3rd ed.). Elsevier Science, 2025, https://doi.org/10.1016/C2024-0-00583-8
5. Verma, P. (Ed.).. Industrial Microbiology and Biotechnology: Emerging Concepts in Microbial Technology. Springer, Singapore. ISBN: 978-981-99-2815-6., 2023, DOI: https://doi.org/10.1007/978-981-99-2816-3
6. Verma, P. (Ed.). Industrial Microbiology and Biotechnology. Springer, Singapore. ISBN: 978-981-16-5213-4, 2022, DOI: https://doi.org/10.1007/978-981-16-5214-1
7. Agrawal, R. Textbook of Industrial Microbiology. Springer, Singapore. ISBN: 978-981-97-9581-9., 2024, DOI: https://doi.org/10.1007/978-981-97-9582-68.

9.2b Laboratory	Working methods [17]	Observations, Time allocation
9.2.b.1. Occupational safety and fire protection training. Laboratory introduction (autoclave, bioreactor, laminar flow hood, centrifuge, etc.)	Practical demonstrations, exercises, experiments	2 hours
9.2.b.2. Batch fermentation for itaconic acid production Using *Aspergillus terreus*		6 hours
9.2.b.3. Enzyme production – β-Galactosidase fermentation Using *E. coli.*		6 hours
9.2.b.4. Bioethanol production via fed-batch fermentation using *Saccharomyces cerevisiae*		6 hours
9.2.b.5. Final evaluation		2 hours

Bibliography for applied activities (seminar / laboratory / project):

1. Rigel, N., & Izquierdo, J. Laboratory Exercises in Microbiology (12th ed.). McGraw-Hill Education. (2022).
2. Badal C Saha, Emerging biotechnologies for production of itaconic acid and its applications as a platform chemical, *Journal of Industrial Microbiology and Biotechnology*, Volume 44, Issue 2, 1 February 2017, Pages 303–315, https://doi.org/10.1007/s10295-016-1878-8
3. Zhang, R.; Liu, H.; Ning, Y.; Yu, Y.; Deng, L.; Wang, F. Recent Advances on the Production of Itaconic Acid via the Fermentation and Metabolic Engineering. *Fermentation* **2023**, *9*, 71. https://doi.org/10.3390/fermentation9010071
4. Ciobanu CP, Blaga AC, Froidevaux R, Krier F, Galaction AI, Cascaval D. Enhanced growth and β-galactosidase production on *Escherichia coli* using oxygen vectors. 3 Biotech. 2020 Jul;10(7):298. doi: 10.1007/s13205-020-02284-4
5. Gennari, A., Simon, R., de Andrade, B. C., Kuhn, D., Renard, G., Chies, J. M., Volpato, G., & Volken de Souza, C. F. (2023). Recombinant production in Escherichia coli of a β-galactosidase fused to a cellulose-binding domain using low-cost inducers in fed-batch cultivation. *Process Biochemistry*, 124, 290–298. https://doi.org/10.1016/j.procbio.2022.11.024
6. Chang, Y.-H.; Chang, K.-S.; Chen, C.-Y.; Hsu, C.-L.; Chang, T.-C.; Jang, H.-D. Enhancement of the Efficiency of Bioethanol Production by *Saccharomyces cerevisiae* via Gradually Batch-Wise and Fed-Batch Increasing the Glucose Concentration. *Fermentation* **2018**, *4*, 45. https://doi.org/10.3390/fermentation4020045
7. Hung, Y. H. R., Chae, M., Sauvageau, D., & Bressler, D. C. (2023). Adapted feeding strategies in fed-batch fermentation improve sugar delivery and ethanol productivity. *Bioengineered*, *14*(1). https://doi.org/10.1080/21655979.2023.2250950
8. Karapatsia, A., Penloglou, G., Chatzidoukas, C., & Kiparissides, C. (2016). Fed-batch Saccharomyces cerevisiae fermentation of hydrolysate sugars: A dynamic model-based approach for high yield ethanol production. *Biomass and Bioenergy*, 90, 32–41. https://doi.org/10.1016/j.biombioe.2016.03.021

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation:	*Completeness and correctness of knowledge.*	*Systematic observation of students (individual/team assignments – assignments*	*20 %*	60%

Final Exam / Assessment	*Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*must be completed during the week between lectures, preparation of a report – case study).*		
		Formative assessment test (ongoing evaluations throughout the semester).	*40 %*	
		Summative assessment test (final evaluation).	*40 %*	
10.5b Laboratory	*Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium).*		40%
10.6 Conditions for passing				
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date: 3.09.2025

Course instructor: Associate professor Alexandra Blaga

Course instructors for applied activities: Associate professor Alexandra Blaga

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name	**Bioprocesses**						
2.1.2 Course code	502	2.1.3. Course category (Fundamental/Specialized/Complementary)					DF
2.2 Course instructor	Prof. dr. ing. Dan Cașcaval, Lecturer dr. bioing. Lenuța Kloetzer						
2.3 Course instructors for applied activities (S, L, P, Pr)	Ș.l. dr. bioing. Lenuța Kloetzer						
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	4	3.2 course	2	3.3a sem.	-	3.3b laboratory	2	3.3c project	-	3.3.d. practice	-	
3.4 Total hours from curriculum[6]	56	3.5 course	28	3.6a sem.	-	3.6b laboratory	28	3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Study in library and practical skills development	24
Preparation of seminars / laboratory works / project phases / home works / presentations	22
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	76
3.8 Total hours per semestre[10]	135
3.9 Number of credits	5

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used. Students must attend the course with their mobile phones turned off.
5.2 Laboratory requirements[13]	Students must enter the laboratory with their mobile phones turned off. During laboratory work, students must wear lab coats and protective equipment appropriate for handling microorganisms. Students must come to the laboratory with written reports on the experiments to be carried out, already studied and understood. Students are not allowed to leave operating equipment unattended. Bringing food into the laboratory is strictly prohibited. Attendance at laboratory sessions is mandatory. Any accident or incident must be reported immediately to the lab supervisor.

6. Overall objective of the course

Bioprocesses course aims to provide students with fundamental and applied knowledge regarding the role and implications of bioprocesses in the chemical industry, with emphasis on their specific applications in food, pharmaceutical, and cosmetic industries. Through the integration of theoretical principles and practical applications, the course develops students' capacity to explain and compare classical and modern biotechnological processes, to evaluate and apply appropriate models and methods, and to operate specific technologies. It also fosters critical thinking, problem-solving abilities, and professional responsibility in relation to biosynthesis, separation methods, and process optimization, preparing graduates to work independently or in multidisciplinary teams in research, innovation, and industry.

7. Learning outcomes

Knowledge	The student / graduate: - explains the fundamental concepts, models, and mechanisms underlying bioprocesses in microorganisms, plants, and animals; - compares classical and modern biotechnological processes and their applications in food, cosmetics, and pharmaceuticals; - evaluates the efficiency, limitations, and industrial applicability of different bioprocesses and separation methods; - defines the physiological, biochemical, and enzymatic processes involved in biosynthesis and product recovery; - describes equipment, technologies, and process flows specific to the bioprocess industry; - uses specialized terminology in professional and academic communication, including in an international context; - applies theoretical knowledge to solve problems of synthesis, biosynthesis, and separation in industrial practice.
Skills	The student / graduate: - uses analytical methods for quantitative and qualitative evaluation of natural and biosynthetic products; - plans and organizes experiments and processes for the optimization of bioprocesses under defined conditions; - operates laboratory and pilot-scale equipment specific to fermentation, biosynthesis, and separation; - critically evaluates experimental data, technological solutions, and process performance, proposing improvements based on evidence.
Responsibility and autonomy	The student / graduate: - respects principles, norms, and ethical values in the correct and timely execution of professional tasks; - assumes responsibility for contributing to professional knowledge and practices, as well as for improving team performance in applied projects; - informs and documents themselves continuously by consulting specialized scientific literature and using modern learning tools; - applies theoretical knowledge to practical problem-solving in industrial contexts, demonstrating initiative and adaptability; - collaborates effectively in individual and team research, showing autonomy and responsibility in decision-making and communication.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Introduction; comparative analysis of chemical processes and bioprocesses	Interactive lecture	2 hours
9.1.2 Particularities of the biosynthesis industry; microorganisms, enzymes		5 hours

9.1.3 Preliminary bioprocessing of raw materials	Guided discussions Clarifying explanations	4 hours
9.1.4 Biosynthesis processes: characteristics, general mechanisms, kinetics		5 hours
9.1.5 Bioprocesses after biosynthesis		4 hours
9.1.6 Bioprocessing specific devices		4 hours
9.1.7 Transcoding bioprocesses to higher operating scale		4 hours
Course bibliography: 1. C. Larroche, M. Angeles Sanroman, G. Du, A. Pandey - Current Developments in Biotechnology and Bioengineering. Bioprocesses, Bioreactors and Controls, Editura Elsevier, Amsterdam, 2016. 2. M. Shuler, F. Kargi, M. DeLisa - Bioprocess Engineering: Basic Concepts, 3rd edition, Editura Pearson, 2017. 3. A.C. Blaga, L. Kloetzer, A. Tucaliuc – Aplicaţiile ale enzimelor şi microorganismelor în industria alimentară şi biochimică, Editura Performantica, Iaşi, 2015. 4. D. Caşcaval, C. Oniscu, A.I. Galaction – Inginerie biochimică şi biotehnologie. 3. Procese de separare, Editura Performantica, Iaşi, 2004. 5. C. Oniscu, D. Caşcaval s.a. – Inginerie biochimică şi biotehnologie – Îndrumar pentru lucrări practice, Lit. UTI, 2000		
9.2b Laboratory	Working methods [17]	
9.2.1b.1 Work safety instructions and presentation of the topic of laboratory	Practical demonstrations, exercises, experiments	2 hours
9.2.b.2 Study of enzymatic and chemical cleavage of proteins		4 hours
9.2.b.3 Determination of thermal effect of biochemical processes		4 hours
9.2.b.4 Enzymatic degradation study of lipids		4 hours
9.2.b.4 Fermentation Fundamentals		6 hours
9.2.b.4 Bioreactor Operation and Process Monitoring		6 hours
9.2.b.7 Final evaluation. Presentation of homework.		2 hours
Bibliography for applied activities (laboratory): 2. C. Larroche, M. Angeles Sanroman, G. Du, A. Pandey - Current Developments in Biotechnology and Bioengineering. Bioprocesses, Bioreactors and Controls, Editura Elsevier, Amsterdam, 2016. 2. M. Shuler, F. Kargi, M. DeLisa - Bioprocess Engineering: Basic Concepts, 3rd edition, Editura Pearson, 2017. 3. A.C. Blaga, L. Kloetzer, A. Tucaliuc – Aplicaţiile ale enzimelor şi microorganismelor în industria alimentară şi biochimică, Editura Performantica, Iaşi, 2015. 4. D. Caşcaval, C. Oniscu, A.I. Galaction – Inginerie biochimică şi biotehnologie. 3. Procese de separare, Editura Performantica, Iaşi, 2004. 5. C. Oniscu, D. Caşcaval s.a. – Inginerie biochimică şi biotehnologie – Îndrumar pentru lucrări practice, Lit. UTI, 2000		

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*	*20 %*	60 %
		Formative assessment test (ongoing evaluations throughout the semester).	*40 %*	
		Summative assessment test (final evaluation).	*40 %*	

10.5b Laboratory	*Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium).*	40 %
10.6 Conditions for passing			
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.			

Date: 3.09.2025

Course instructor: Prof. dr. ing. Dan Cașcaval, Ș.l. dr. bioing. Lenuța Kloetzer 

Course instructors for applied activities: Ș.l. dr. bioing. Lenuța Kloetzer 

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

Bachelor's / Master's degree.
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Bioinformatic & Bioanalysis**			
2.1.2 Course code				503	2.1.3. Course category Fundamental/Specialized/Complementary)		DS
2.2 Course instructor				Lecturer Elena Niculina Dragoi			
2.3 Course instructors for applied activities (S, L, P, Pr)				Lecturer Elena Niculina Dragoi			
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	V	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2	3.2 course	1	3.3a sem.	0	3.3b laboratory	0	3.3c project	1	3.3.d. practice	0
3.4 Total hours from curriculum[6]	28	3.5 course	14	3.6a sem.	0	3.6b laboratory	0	3.6c project	14		

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	15
Study in library and practical skills development	15
Preparation of seminars / laboratory works / project phases / home works / presentations	17
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	47
3.8 Total hours per semestre[10]	75
3.9 Number of credits	3

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	The classroom must have a video projector, Internet connection and a whiteboard/blackboard for examples
5.2 Laboratory requirements[13]	The laboratory room must have an Internet connection and a whiteboard/blackboard for examples. The students need computers with a language/software that allows them to solve laboratory assignments (Excel/Matlab recommended).

6. Overall objective of the course

This course covers computational and analytical methods in proteomics and structural bioinformatics, emphasizing practical skills using accessible software tools for protein analysis, structure prediction, and visualization.

7. Learning outcomes

Knowledge	The student / graduate: - understands core concepts of proteomics and structural bioinformatics, including protein structure, function, and the relationship between sequence and structure. - describes experimental and computational methods used in proteomics and structural bioinformatics. - recognizes the main databases and tools and their applications in protein analysis and structure visualization. - explains the strengths and limitations of different analytical and computational approaches in proteomics and structural bioinformatics.
Skills	The student / graduate: - applies bioinformatics tools and free software to analyse proteomics and structural data. - processes and interprets proteomics data: import, clean, and analyze mass spectrometry data; identifies and quantify proteins; performs statistical analysis and visualize results using Excel and MATLAB. - predict and validate protein structures: use sequence alignment, secondary/tertiary structure prediction, homology modelling, and molecular docking tools. -critically evaluates and compares results from different methods, and select appropriate strategies for specific research questions. -communicates findings clearly in written reports and oral presentations, using appropriate scientific language and visualization
Responsibility and autonomy	The student / graduate: - works independently and collaboratively to solve complex problems in proteomics and structural bioinformatics, including project planning and time management. -demonstrates scientific integrity: critically assess data quality, reproducibility, and ethical considerations in bioinformatics research. - takes responsibility for continuous learning: seek out and evaluate new tools, databases, and literature to stay current in the rapidly evolving fields of proteomics and structural bioinformatics. - reflects on the societal and biomedical impact of proteomics and structural bioinformatics, considering applications in health, industry, and research

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Introduction to Proteomics. Protein structure and function overview. Protein identification and quantification methods. Protein post-translational modifications. Introduction to proteomic databases	Interactive lecture Guided discussions Clarifying explanations	2 hours
9.1.2. Computational Proteomics. Protein sequence analysis and motif detection. Mass spectrometry data analysis basics. Protein-protein interaction databases and prediction methods. Quantitative proteomics data processing		4 hours
9.1.3. Protein Structure Basics. Levels of protein structure: primary, secondary, tertiary, quaternary. Protein structure databases. Visualization of protein structures		4 hours
9.1.4. Protein Structure Prediction. Secondary structure prediction methods. Homology modelling and threading. Ab initio structure prediction basics. Structure refinement and validation		4 hours
Course bibliography: 1. Jenny Gu (Editor), Philip E. Bourne (Editor), Structural Bioinformatics, 2nd Edition. ISBN: 978-0-470-18105-8. Wiley-Blackwell (2009) 2. Jonathan Pevsner. Bioinformatics and Functional Genomics, 3rd edition. ISBN: 978-1-118-58176-6 (2015)		
9.2c Project	Working methods [17]	Observations, Time allocation

9.2.c. Optimization of Recombinant Protein Production Using Integrated Bioinformatics and Bioanalytical Approaches	Practical demonstrations, exercises, experiments	
9.2.c.1. Phase 1: Target Protein Selection and Analysis		2 hours
9.2.c.2. Phase 2: Bioprocess Design and Modelling		10 hours
9.2.c.3. Final evaluation		2 hours

Bibliography for applied activities (seminar / laboratory / project):

1. "Bioinformatics with MATLAB: Practical Applications in Proteomics and Structural Biology" (various authors, MathWorks documentation). Guides on using MATLAB Bioinformatics Toolbox for sequence analysis, mass spectrometry data processing, and protein structure visualization. https://www.mathworks.com/products/bioinfo.html
2. "PyMOL User's Guide" . Documentation and tutorials for molecular visualization and structural analysis using PyMOL.https://pymol.sourceforge.net/newman/userman.pdf

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method		10.3 Percentage of the final grade *(recommended to be proportional to the number of hours allocated to each type of activity)*
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Formative assessment test (ongoing evaluations throughout the semester).*	*50 %*	50%
		Summative assessment test (final evaluation).	*40 %*	
10.5b Project	*Project activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of project sheets (all project works must be completed)*		50%
10.6 Conditions for passing				
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date: 3.09.2025

Course instructor: Lecturer Elena Niculina Dragoi

Course instructors for applied activities: Lecturer Elena Niculina Dragoi

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*

[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Instrumental analysis of molecules**			
2.1.2 Course code				504	2.1.3. Course category Fundamental/Specialized/Complementary)		DF
2.2 Course instructor				Professor Adrian Ungureanu			
2.3 Course instructors for applied activities (S, L, P, Pr)				Professor Adrian Ungureanu			
2.4 Year of study [2]	1	2.5 Semester I[3]	1	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	4	3.2 course	2	3.3a sem.	0	3.3b laboratory	2	3.3c project	0	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	56	3.5 course	28	3.6a sem.	0	3.6b laboratory	28	3.6c project	0			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Study in library and practical skills development	26
Preparation of seminars / laboratory works / project phases / home works / presentations	20
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	76
3.8 Total hours per semestre[10]	135
3.9 Number of credits	5

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used. Students must attend the course with their mobile phones turned off.
5.2 Laboratory requirements[13]	Students must enter the laboratory with their mobile phones turned off. During laboratory work, students must wear lab coats and protective equipment appropriate for handling microorganisms. Students must come to the laboratory with written reports on the experiments to be carried out, already studied and understood. Students are not allowed to leave operating equipment unattended. Bringing food into the laboratory is strictly prohibited. Attendance at laboratory sessions is mandatory. Any accident or incident must be reported immediately to the lab supervisor. Unauthorized handling of microorganisms and equipment is strictly forbidden.

6. Overall objective of the course

In this course, methods for the characterization and testing of organic and macromolecular compounds will be presented, including: emission spectroscopy (fluorescence, bio- and chemiluminescence); chromatographic methods such as HPLC, GPC, HPSEC, gas chromatography, and coupled or tandem chromatographic techniques (GC-MS, HPLC-MS) for the analysis of chemical

systems. By completing the course and its applications, students will acquire skills to understand the theoretical aspects and apply them in practical situations as well as the ability to develop viable solutions within the field of chemical and biochemical engineering.

7. Learning outcomes

Knowledge	The student / graduate: - explains the fundamental principles of molecular spectrometry, including absorption, vibration, emission, and luminescence phenomena. - dscribes the interaction between electromagnetic radiation and matter, and the basic components and operation of spectrometers. - applies spectroscopic methods (fluorescence, bio- and chemiluminescence) for the identification and quantitative analysis of organic compounds and biomolecules. - compares and understands liquid chromatographic systems (HPLC, HPSEC, GPC), identifying their main components and functions. - explains the principles and operation of GC, including detector and column selection based on analytical requirements; interprets chromatographic data and assess theoretical aspects of separation mechanisms in liquid chromatography. - uses appropriate analytical methods for the characterization and quantitative analysis of biomolecules.
Skills	The student / graduate: - uses appropriate analytical methods for the characterization and quantitative analysis of biomolecules. - analyse the consistency of experimental data using simple models. - operates specific spectroscopic and chromatographic systems. - critically evaluates different instrumental methods and propose viable analytical solutions in the field of chemical and biochemical engineering.
Responsibility and autonomy	The student / graduate: - respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; - assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; - engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Absorption, vibration and emission molecular spectrometry. Elementary notions. Electromagnetic radiation- matter interaction. Luminescence. Basic elements of spectrometers. Applications of use in biomolecules identification and quantitative analysis.	Interactive lecture Guided discussions Clarifying explanations	8 hours
9.1.2. Liquid chromatography in biomolecules characterization: Fundamentals of liquid chromatography, types of liquid chromatography (HPLC, HPSEC, GPC). Description of the components of HPLC systems, role and importance. Data processing - theoretical aspects.		12 hours
9.1.3 Gas chromatography –Fundamentals of separation, methods of operation and detection. Principles for working conditions, column and detector selection.		4 hours
9.1.4 Principles in design and choosing of analytical methods for analysis of biomolecules.		4 hours

Course bibliography:

1. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, Principles of Instrumental Analysis (Chapters 13, 14 and 27), Seventh Edition, Published by Cengage Learning, 2017.
2. C. N. Banwell, Elaine M. McCash Fundamentals of Molecular Spectroscopy, McGraw-Hill, 1994

3. Champiat, J.-P. Larpent, *Bio-chimi-luminescence. Principes et applications*. Masson, Pris, Milan, Barcelone, Bonn, 1993
4. R. Olinescu, Maria Greabu, *Chemiluminescenţă şi bioluminescenţă*, Ed. Tehnică, Bucureşti, 1987
5. Yuegang Zuo, PhD (Editor), High-Performance Liquid Chromatography (HPLC): Principles, Practices and Procedures Dartmouth, North Dartmouth, MA, USA
6. I. Pogany, M. Banciu, *Tehnica experimentala in chimia organica*, Ed. Stiintifica si Enciclopedica, Bucuresti, 1977
7. L. Roman, R. Săndulescu, *Chimie analitică. Vol. III. Metode de separare şi analiză instrumentală*, Ed. Did. & Ped. 1999
8. K. W. Hutchenson, N. Foster, *Innovations in supercritical fluids. Science and Technology*, ACS Symposium Series, Washington, DC,1995

9.2b Laboratory	Working methods [17]	Observations, Time allocation
9.2.1 Absorption and emission molecular spectrometry. UV-VIS and fluorescence spectroscopy. Spectra recording of quinine and fluoresceine solution. Quantitative determination	Practical demonstrations, exercises, experiments	4 hours
9.2.2 FT-IR spectroscopy. Fundamentals and practical approach in recording and data processing		4 hours
9.2.3 Liquid chromatography –HPLC principles. System description. Practical approach in chromatographic separation – establishing retention time methods;		4 hours
9.2.4 Liquid chromatography –HPLC practical approach in system calibration and quantitative determination of biomolecules		4 hours
9.2.5 HPSEC and GPC chromatography applications for biomacromolecules characterization		4 hours
9.2.6 Applications of gas-chromatography in biomolecules separation and determination		4 hours
9.2.7 Comparative assessment and evaluation of studied techniques as prerequisite in establishing analytical protocols. Student evaluation.		4 hours

Bibliography for applied activities (seminar / laboratory / project):
1. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, Principles of Instrumental Analysis (Chapters 13, 14 and 27), Seventh Edition, Published by Cengage Learning, 2017.
2. C. N. Banwell, Elaine M. McCash Fundamentals of Molecular Spectroscopy, McGraw-Hill, 1994
3. Yuegang Zuo, PhD (Editor), High-Performance Liquid Chromatography (HPLC): Principles, Practices and Procedures Dartmouth, North Dartmouth, MA, USA
4. Agilent Technologies, Fundamentals of Gas Chromatography, First Edition, 2002.
5. Valtcho D. Zheljazkov, Charles L. Cantrell, Tess Astatkie, Ekaterina Jeliazkova, Distillation Time Effect on Lavander Essential Oil Yield and Composition, Journal of Oleo Science, 62, 2013, pp. 195-199.
6. Adrian Ungureanu, Cataliză şi materiale catalitice. Lucrări practice de laborator (format electronic), 2015.
7. Hawaa S. Elferjani, Najw H. S. Ahmida, Aziza Ahmida, Determination of Hydroquinone in Some Pharmaceutical and Cosmetic Preparations by Spectrophotometric Method, International Journal of Science and Research, 6, 2017, pp. 2219 2224.
8. Mettler Toledo, UV-Vis Application Note M9113, Hydroquinone in Cosmetics (https://www.mt.com)

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*	*20 %*	60%
		Formative assessment test (ongoing evaluations throughout the semester).	*40 %*	

	Ability to process data and solve given problems.	*Summative assessment test (final evaluation).*	*40 %*	
10.5b Laboratory	*Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium).*		40%
10.6 Conditions for passing				
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date: 01.09.2025

Course instructor: Professor Adrian Ungureanu

Course instructors for applied activities: Professor Adrian Ungureanu

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Scientific research/Engineering project in Biochemical Engineering**			
2.1.2 Course code				505	2.1.3. Course category Fundamental/Specialized/Complementary)		DS
2.2 Course instructor				PhD Lecturer Alexandra Tucaliuc			
2.3 Course instructors for applied activities (S, L, P, Pr)				PhD Lecturer Alexandra Tucaliuc			
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	V	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	4	3.2 course	1	3.3a sem.	1	3.3b laboratory	2	3.3c project	0	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	56	3.5 course	14	3.6a sem.	14	3.6b laboratory	28	3.6c project	0			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	25
Study in library and practical skills development	15
Preparation of seminars / laboratory works / project phases / home works / presentations	10
Evaluation[8]	6
Other activities:	

3.7 Total hours of individual study [9]	56
3.8 Total hours per semestre[10]	108
3.9 Number of credits	4

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used. Students must attend the course with their mobile phones turned off.
5.2 Laboratory requirements[13]	Students must enter the laboratory with their mobile phones turned off. During laboratory work, students must wear lab coats and protective equipment appropriate for handling microorganisms. Students must come to the laboratory with written reports on the experiments to be carried out, already studied and understood. Students are not allowed to leave operating equipment unattended. Bringing food into the laboratory is strictly prohibited. Attendance at laboratory sessions is mandatory. Any accident or incident must be reported immediately to the lab supervisor. Unauthorized handling of microorganisms and equipment is strictly forbidden.

6. Overall objective of the course

The course aims to provide students with a foundational understanding of bioreactor design for fermentation control, with a strong emphasis on geometry, real-time monitoring and precise adjustment of key parameters to maintain an optimal growth

environment for microorganisms and maximize product yield. Students will gain advanced insights into the design, operation, and optimization of fermentation processes in different types of bioreactor.

7. Learning outcomes

Knowledge	The student / graduate: - describes the basic principles of fermentations processes in specific equipment for sustainable manufacture of industrial products. - explains the basic principles of biocatalytic reactions in different types of bioreactors. - recognizes the specific parameters that can be controlled for bioprocess optimization. - classifies industrial bioreactor types and their operating modes (batch, fed-batch, continuous), including key control parameters and monitoring strategies. - describe the basic concepts of mass balances and process calculations in bioreactors
Skills	The student / graduate: - determine how to choose the right bioreactor design in order to facilitate efficient oxygen transfer, mixing, and heat distribution while also allowing for reliable monitoring and control of parameters like pH and temperature. - evaluate the unit operations applied in biochemical engineering - critically evaluate the feasibility of fermentation, microbial biocatalytic and enzymatic processes in an industrial context and devise a research/development plan - evaluate different bioreactors operating modes (batch, fed-batch, continuous etc.) and their benefits and drawbacks in relation to fermentation process for industrial products manufacturing - create solutions for specific problems in bioreactor manipulation
Responsibility and autonomy	The student / graduate: - respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; - assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; - engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Fundamentals of bioreactor design: ideal vs. non-ideal bioreactors, stirred tank reactor (STR) geometry, impellers, spargers, design equations and scale-up considerations	Interactive lecture Guided discussions Clarifying explanations	2 hours
9.1.2. Types of bioreactors and operating modes: batch, fed-batch, continuous (chemostat), mechanical stirred vs. airlift bioreactors, advantages, limitations, industrial applications		2 hours
9.1.3. Microbial growth kinetics in bioreactors: Monod and substrate-inhibition models; determination of growth parameters (μmax, Ks, Yx/s), effect of pH, DO, temperature, shear stress.		2 hours
9.1.4. Immobilized cell systems: carrier types and immobilization techniques, mass transfer limitations in immobilized systems, applications in industry and biocatalysis		2 hours
9.1.5. Instrumentation and control in bioreactors: pH, DO, temperature, agitation, airflow sensors, basic control strategies (PID, cascade)		2 hours
9.1.6. Mass Balances and process calculations: cell mass, substrate, and product balances, elemental and redox balances, gas balances (O_2 uptake, CO_2 evolution)		2 hours

9.1.7. Bioprocess design and optimization: use of models in process optimization, case studies of scale-up and tech transfer, economic and sustainability aspects		2 hours

Course bibliography:

1. S Katoh (2015). Biochemical Engineering 2e – A Textbook for Engineers, Chemists and Biologists, Ed. Wiley Vch. Germany ISBN: 9783527338047.
2. Avijit Ghosh, Sudipta Dey Bandyopadhyay, Subhabrata Sengupta (2021) – Advances in Bioprocess Engineering and Technology, Ed. Springer Verlag, Singapore
3. J. Smith – Biotechnology, Fifth edition, Cambridge University Press, The Edinburgh Building, Cambridge CB2 8RU, UK, 2009
4. Najafpour-Darzi, G. Biochemical Engineering and Biotechnology (3rd ed.). Elsevier Science, 2025, https://doi.org/10.1016/C2024-0-00583-8
5. Zhong, J.-J. Bioreactor Engineering. In *Comprehensive Biotechnology*; Elsevier: Amsterdam, The Netherlands, 2011; pp. 257–269.

9.2b Laboratory	Working methods [17]	Observations, Time allocation
9.2.b.1. Bioreactor Setup and Sterilization: Components of a bench-scale stirred tank bioreactor; Inoculation and sterilization procedures; Aseptic techniques	Practical demonstrations, exercises, experiments	4 hours
9.2.b.2. Microbial growth in stirred tank bioreactor (free cells): batch fermentation *s. cerevisiae*, monitoring OD, pH, DO, agitation, calculation of growth rate and yield		4 hours
9.2.b.3. Microbial growth in airlift bioreactor: setup of a lab-scale airlift reactor, comparison of growth parameters with STR, Gas-liquid mass transfer estimation		4 hours
9.2.b.4. Immobilized cell fermentation: immobilization using alginate beads, fermentation with immobilized *Saccharomyces*, analysis of productivity and stability		4 hours
9.2.b.5. Determination of k_{La} (oxygen transfer rate): dynamic gassing-out method, effect of agitation and aeration on oxygen transfer, correlation with microbial growth		4 hours
9.2.b.6. Mass balances in bioreactor experiments: calculation of cell yield, substrate consumption, product formation; data processing from experimental runs; biomass and CO_2 balances		3 hours
9.2.b.7. Comparative operation – batch vs. fed-batch: setup of a simple fed-batch strategy; monitoring substrate concentration and productivity; advantages in preventing substrate inhibition		4 hours
9.2.b.8. Final evaluation		1 hours
9.3 Seminar		
9.3.1 Theoretical bioreactor design: students solve design problems for STR and airlift reactors; design calculations (volume, power input, aeration)		4 hours
9.3.2 Growth curve analysis and parameter estimation: analysis of real or simulated data sets; estimation of μmax, Yx/s, qs, qp, maintenance coefficient		4 hours
9.3.3 Bioprocess case study – from Lab to Pilot: analysis of a published fermentation process; discussion of scale-up challenges; process flow diagrams and economic evaluation		4 hours
9.3.4 Final evaluation		2 hours

Bibliography for applied activities (seminar / laboratory / project):

1. Sobotka M, et al. Review of Methods for the Measurement of Oxygen Transfer in Microbial Systems. Ann. Rep. Ferm. Proc. 5, 1982: 127–210; http://dx.doi.org/10.1016/B978-0-12-040305-9.50009-1.
2. Tribe LA, Briens CL, Margaritis A. Determination of the Volumetric Mass Transfer Coefficient (kLa) Using the Dynamic "Gas out–Gas in" Method: Analysis of Errors Caused by Dissolved Oxygen Probes. Biotechnol. Bioeng. 46(4) 1995: 388–392; https://doi.org/10.1002/bit.260460412.
3. Suresh S, Srivastava VC, Mishra IM. Techniques for Oxygen Transfer Measurement in Bioreactors: A Review. *J. Chem. Technol. Biotechnol.* 84(8) 2009: 1091–1103; https://doi.org/10.1002/jctb.2154.
4. Ying Zhu, hapter 14 - Immobilized Cell Fermentation for Production of Chemicals and Fuels in Bioprocessing for Value-Added Products from Renewable Resources. New Technologies and Applications, 2007, Pages 373-396, https://doi.org/10.1016/B978-044452114-9/50015-3
5. Federico Cerrone & Kevin E. O'Connor, Cultivation of filamentous fungi in airlift bioreactors: advantages and disadvantages, Applied Microbiology and Biotechnology, 109(41), 2025
6. MJ Rossi , FX Nascimento, AJ Giachini, VL Oliveira, A Furigo Jr., Airlift bioreactor fluid-dynamic characterization for the cultivation of shear stress sensitive microorganisms, Journal of Advances in Biotechnology, 2016, 5(2), ISSN 2 3 4 8 - 6 2 0 1

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method		10.3 Percentage of the final grade *(recommended to be proportional to the number of hours allocated to each type of activity)*
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*	*20 %*	50%
		Formative assessment test (ongoing evaluations throughout the semester).	*40 %*	
		Summative assessment test (final evaluation).	*40 %*	
10.5b Laboratory/Seminar	*Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.* *Capacity for engineering problems solving* *Capacity for design and specific parameter calculations in biochemical processes*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium /seminar test).*		50%
10.6 Conditions for passing				
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date: 3.09.2025

Course instructor: PhD Lecturer Alexandra Tucaliuc

Course instructors for applied activities: PhD Lecturer Alexandra Tucaliuc

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*

[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Ethics and Integrity**			
2.1.2 Course code				506	2.1.3. Course category Fundamental/Specialized/Complementary)		DS
2.2 Course instructor				Associate professor Irina Cârlescu			
2.3 Course instructors for applied activities (S, L, P, Pr)				Associate professor Irina Cârlescu			
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	V	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2	3.2 course	1	3.3a sem.	1	3.3b laboratory	0	3.3c project	0	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	28	3.5 course	14	3.6a sem.	0	3.6b laboratory	14	3.6c project	0			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	20
Study in library and practical skills development	15
Preparation of seminars / laboratory works / project phases / home works / presentations	15
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	53
3.8 Total hours per semestre[10]	81
3.9 Number of credits	3

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector will be used. Students must attend the course with their mobile phones turned off.
5.2 Seminar requirements[13]	Whiteboard, video projector, specific materials will be used. Students must attend the seminar with their mobile phones turned off.

6. Overall objective of the course

The course aims to provide students with a foundational understanding of concepts specific to academic ethics and integrity with a view to implementing them in the academic environment and developing a responsible professional career, as moral conduct is an important benchmark of professionalism. Students will gain advanced insights into the access to scientific literature, good conduct in research, data processing, intellectual property and copyright, plagiarism. By completing the course and seminar, students will acquire skills in understanding theoretical aspects they can put into practice in concrete situations and will be able to develop viable solutions in the field of chemical and biochemical process technology.

7. Learning outcomes

Knowledge	The student / graduate: - describes the basics concepts of academic ethics like moral principles, values and rules or personal responsibility. - explains the ethics issue in academic writing, communication or dissemination of information. - summarizes the good conduct in research, data processing, intellectual property and copyright, plagiarism.
Skills	The student / graduate: - uses the concepts acquired to identify and solve problems with ethical implications. - plans documentation and research in accordance with the principles of ethics and integrity. - uses the data and interprets the research results in accordance with the good practice rules. - critically evaluate scientific fraud. - uses dedicated software for writing bibliographic references and correctly citing authors. - identifies and solves issues with ethical implications in chemical and biochemical process technology.
Responsibility and autonomy	The student / graduate: - respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; - assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; - engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Fundamental concepts and distinctions of academic ethics. Origins of ethics. Major ethical traditions: morality, legality, religion. Principles, values and moral rules: moral, immoral, non-moral. Moral autonomy and personal responsibility.	Interactive lecture Guided discussions Clarifying explanations	2 hours
9.1.2. Implementation of academic ethics and integrity procedures in the university environment. The regulatory framework specific to institutional ethics. Ethics codes and committees. Moral rules and etiquette in academia. Examples of good practice.		2 hours
9.1.3. Academic freedom and disagreement in science. Collaboration, complicity and the warning of integrity. Access to resources.		2 hours
9.1.4. Good conduct in research and development. Definitions. Intellectual property and copyright.		2 hours
9.1.5. Writing a scientific paper in accordance with the principles of ethics and academic integrity.		2 hours
9.1.6. Scientific fraud, plagiarism and duplication of publication (self-plagiarism). Forms of plagiarism. Plagiarism procedures. Other forms of academic dishonesty.		2 hours
9.1.7. Ways of quick identification of scientific fraud. Examples of scientific fraud cases. Consequences and sanctions. Social effects of lack of academic integrity.		2 hours

Course bibliography:

1. Bernard Williams. Morality: an introduction to ethics. Cambridge University Press, (1993).
2. David L. Finegold, Cécile M. Bensimon, Abdallah S. Daar, Margaret L. Eaton, Béatrice Godard, Bartha Maria Knoppers, Jocelyn E. Mackie and Peter A. Singer. Bioindustry ethics. Academic Press, (2005).
3. Peter Singer. A companion to ethics. Wiley-Blackwell, 1993.
4. Andrei Avram, Cătălin Berlic, Bogdan Murgescu, Mirela-Luminița Murgescu, Marian Popescu, Cosima Rughiniș, Dumitru Sandu, Emanuel Socaciu, Emilia Șercan, Bogdan Ștefănescu, Simina Elena Tănăsescu, Sanda Voinea. Academic ethics. Framework curriculum. University of Bucharest Publishing (2018).
5. Emanuel Socaciu, Constantin Vică, Emilian Mihailov, Toni Gibea, Valentin Mureșan, Mihaela Constantinescu. Ethics and academic integrity. University of Bucharest Publishing (2018).

6. Carmen Bălan, Carmen Diaconu. Copyright and other intellectual property rights legislation in Romania. Deontological aspects of research and publication of scientific results. Chapter 2 in Handbook of Scientific Authorship. Coord. Ioan Dumitrache și Horia Iovu. http://www.ubm.ro/sites/al/images/docs/ManualAutoriat.pdf (2009).
7. Code of Ethics and Professional Academic Deontology of "Gheorghe Asachi" Technical University of Iasi. http://www.calitate.tuiasi.ro/TUIASI.COD.01_Codul%20de%20etica_E3R0%20(1).pdf. (Accessed on 22.01.2019).
8. http://www.ccea.ro/etica-si-integritate-academica/ (Accessed on 22.01.2019)

9.2b Seminar	Working methods [17]	Observations, Time allocation
9.2.b.1. Tolerated deviance. Factors influencing moral behaviour. Deontologism. Utilitarianism. Virtue ethics. Ethics in chemical and biochemical process technology.	Practical demonstrations, exercises, experiments	2 hours
9.2.b.2. Fabrication or deliberate alteration of experimental data. Forms of plagiarism. Problems and solutions. Ethics of scientific data processing. Documentation.		2 hours
9.2.b.3. Management and insertion of bibliographic references in documents using dedicated software.		2 hours
9.2.b.4. Ethics of presenting scientific data.		2 hours
9.2.b.5. Use of electronic means of checking work: advantages, limitations.		2 hours
9.2.b.6. Ethics in evaluation/auto-evaluation. Consequences and sanctions. Social effects of lack of academic integrity.		2 hours
9.2.b.7. Final evaluation.		2 hours

Bibliography for applied activities (seminar / laboratory / project):

1. Emilia Șercan. Academic ethics: a practical guide. University of Bucharest Publishing (2017).
2. Jay D. Humphrey, Jeffrey W. Holmes. Style and Ethics of Communication in Science and Engineering. Morgan & Claypool Publishers, (2009).
3. M. Șt. Rădulescu, Scientific research methodology. Elaboration of bachelor, master, doctoral works. Didactic and Pedagogical Publishing, Bucharest, (2011).
4. http://www.anelisplus.ro/wp-content/uploads/2018/06/Ghid_de_utilizare_Web-of-Science-2018.pdf
5. Clarivate Analytics Master Journal List (ISI) http://mjl.clarivate.com
6. Scopus https://www.scopus.com/sources

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*	*20 %*	70%
		Formative assessment test (ongoing evaluations throughout the semester).	*40 %*	
		Summative assessment test (final evaluation).	*40 %*	
10.5b Laboratory	*Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium).*		30%
10.6 Conditions for passing				

The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date: 3.09.2025

Course instructor: Associate professor Irina Cârlescu

Course instructors for applied activities: Associate professor Irina Cârlescu

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Project creation and management**			
2.1.2 Course code				514.1	2.1.3. Course category Fundamental/Specialized/Complementary)		DS
2.2 Course instructor				Lecturer Sofronia Bouariu			
2.3 Course instructors for applied activities (S, L, P, Pr)				Lecturer Sofronia Bouariu			
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOP

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2	3.2 course	1	3.3a sem.	0	3.3b laboratory	0	3.3c project	1	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	28	3.5 course	14	3.6a sem.	0	3.6b laboratory	0	3.6c project	14			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	10
Study in library and practical skills development	15
Preparation of seminars / laboratory works / project phases / home works / presentations	25
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	50
3.8 Total hours per semestre[10]	81
3.9 Number of credits	3

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used. Mobile phones and laptops should be used only for course-related purposes (note-taking, online collaboration tools, research).
5.2 Project requirements[13]	Attendance at project sessions is mandatory. Students are expected to come prepared, having read and analysed the assigned materials. Teamwork and active participation are compulsory. Respect for deadlines, academic integrity, and responsible collaboration are strictly required throughout the project activities.

6. Overall objective of the course

The overall objective of the course is to develop students' ability to design, plan, and manage research and development projects in the field of chemical and biochemical process technology. The course aims to provide the theoretical knowledge and practical tools necessary to create competitive project proposals, organize research activities efficiently, and ensure the successful implementation and reporting of scientific projects.

7. Learning outcomes

Knowledge	The student / graduate: - defines the main concepts and principles of project creation, planning, and management, with a focus on research and development projects in chemical and biochemical process technology; - describes the stages of the project life cycle, including initiation, planning, implementation, monitoring, and closure; - explains the structure and components of research project proposals (objectives, methodology, budgeting, risk assessment, dissemination); - identifies funding sources and institutional frameworks relevant to scientific and technological projects.
Skills	The student / graduate: - applies project management concepts and tools to design and plan a research project; - develops coherent and competitive project plans in the field of chemical and biochemical process technology; - evaluates project feasibility, risks, and performance indicators; - uses digital tools for project organization, collaboration, and reporting; - communicates project outcomes effectively, both in written and oral forms, adapting content to scientific and professional audiences.
Responsibility and autonomy	The student / graduate: - demonstrates initiative, accountability, and ethical conduct in coordinating and implementing project activities; - collaborates effectively in interdisciplinary teams, contributing to planning, decision-making, and evaluation processes; - adheres to principles of research integrity, professional ethics, and institutional regulations; - engages in continuous professional development through independent study and lifelong learning; - reflects critically on personal and team performance to improve research and project management practices.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning, facilitated through exploration of real-world scenarios and case studies related to research and development projects in chemical and biochemical process technology. Additionally, action-based methods will be employed, such as drafting project proposals, planning project schedules, performing risk assessments, resource allocation exercises, and team-based problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Introduction to project creation and management: overview and objectives of project management; glossary of key terms and definitions; the role and responsibilities of a project manager	Interactive lecture Guided discussions Clarifying explanations Case studies	2 hours
9.1.2. Projects in biotechnology and bio-industries (examples of projects, specific challenges)		1 hour
9.1.3. Project life cycle and core concepts (phases of a project, methodologies)		3 hours
9.1.4. Project resources and team management (resource allocation, budgeting, scheduling, team roles)		2 hours
9.1.5. Project management tools and techniques		3 hours
9.1.6. Practical considerations and common mistakes		3 hours

Course bibliography:

1. Harold K., 2021, Project Management: A systems approach to planning, scheduling and controlling, Willey Ed.
2. Volf I., Teodosiu C., 2007, Managementul proiectelor de mediu, Ed. Politehnium, Iaşi.
3. Volf I., 2006, Ecotehnologii, ecoproduse, ecoservicii, Ed. Ecozone, Iaşi.
4. Nedelcu D., Pruteanu O., 2005, Managementul proiectelor. Aspecte teoretice şi practice, Ed. Politehnium, Iaşi.
5. Opran C., Stan S., 2003, Planificarea, elaborarea şi implementarea proiectelor; Şcoala Naţională de Studii Politice şi Administrative, Facultatea de Comunicare şi Relaţii Publice "David Ogilvy", Departamentul ID, editura comunicare.ro.
6. Opran C., Stan S.,2004, Managementul proiectelor; Editura comunicare.ro, Bucuresti.
7. Oprea D., 2001, Managementul proiectelor, Ed. Sedcom Libris, Iaşi.
8. Richards, J.D, Frosch, R.A., 1997, „The Industrial Green Game- Overview and Perspectives", National Academy Press
9. Roberts P., 2017, Ghid pentru managementul proiectelor. The Economist, ISBN 9789737115492

9.2c Project	Working methods [17]	Observations, Time allocation
9.2.c.1. Introduction and team formation	Assisted work Collaborative work Guided exercises Group discussion	1 hour
9.2.c.2. Project planning and resource allocation		4 hours
9.2.c.3. Risk assessment and proposal drafting		5 hours
9.2.c.4. Team problem-solving and peer review		2 hours
9.2.c.5. Project presentation and wrap-up		2 hours

Bibliography for applied activities (project):

1. Harold K., 2021, Project Management: A systems approach to planning, scheduling and controlling, Willey Ed.
2. Nedelcu D., Pruteanu O., 2005, Managementul proiectelor. Aspecte teoretice şi practice, Ed. Politehnium, Iaşi.
3. Opran C., Stan S.,2004, Managementul proiectelor; Editura comunicare.ro, Bucuresti.
4. Roberts P., 2017, Ghid pentru managementul proiectelor. The Economist, ISBN 9789737115492.
5. Turner, J.R., 2016, Gower Handbook of Project Management, 5th Edition, Routledge.
6. Kerzner, H., 2022, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 13th Edition, Wiley.
7. Schwalbe, K., 2021, Information Technology Project Management, 9th Edition, Cengage.

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final exam	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.*	*Summative assessment test (final evaluation).*	*100%*	50%
10.5c Project	*Participation in project activities, ability to apply knowledge, quality of project plan/proposal, problem-solving and teamwork, clarity and effectiveness of presentation*	*Completion of the project plan/proposal;* *Team-based work;* *Project presentation / defense.*		50%
10.6 Conditions for passing				
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date: 3.09.2025

Course instructor: Lecturer Sofronia Bouariu

Course instructors for applied activities: Lecturer Sofronia Bouariu

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	"Gheorghe Asachi" Technical University of Iasi
1.2 Faculty	"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection
1.3 Department	Organic, Biochemical and Food Engineering
1.4 Field	Chemical Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name				Management and communication in industry			
2.1.2 Course code				607	2.1.3. Course category Fundamental/Specialized/Complementary)		DS
2.2 Course instructor				Professor PhD Eng Daniela Șuteu			
2.3 Course instructors for applied activities (S, L, P, Pr)				Professor PhD Eng Daniela Șuteu			
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOP

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2	3.2 course	1	3.3a sem.	0	3.3b laboratory	0	3.3c project	1	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	28	3.5 course	14	3.6a sem.	0	3.6b laboratory	0	3.6c project	14			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	20
Study in library and practical skills development	10
Preparation of seminars / laboratory works / project phases / home works / presentations	20
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	50
3.8 Total hours per semestre[10]	91
3.9 Number of credits	3

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used. Students must attend the course with their mobile phones turned off.
5.2 Project requirements[13]	- free discussions with different guests from the entrepreneurial field on topics established together with the students

6. Overall objective of the course

The course aims to provide students with the ability to use cutting edge theoretical and practical knowledge in the field of management and communication in engineering as a basis for the development and/or original application of ideas. It also aims to learn useful skills in communication in meetings, presentations of objectives and internal or external meetings.

7. Learning outcomes

Knowledge	The student / graduate: - describes the role of management and communication in development of the performance of industrial activity - explains the basic concepts, phenomena, theories, models, methods and techniques specific to industrial management and comunication - knowledge of key issues in the field of engineering management and communication and the area of interference between fields
Skills	The student / graduate: - developing marketing, communication and sales strategies based on acquired communication and negotiation skills - analyses a specific situation in the company and looks for ways to solve it - critically evaluates the role of communication at the company/industrial level in developing/avoiding management problems - learning useful skills in communication in meetings, presentations of objectives and internal or external meetings - create solutions for specific problems in industrial management using the principles of operative management
Responsibility and autonomy	The student / graduate: - respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; - assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; - engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Business management: particularities of management functions in small and medium enterprises; forecasting in small and medium enterprises; organization in small and medium enterprises; coordination in small and medium enterprises; control in small and medium enterprises; human resources management in small and medium enterprises.	Interactive lecture Guided discussions Clarifying explanations	4 hours
9.1.2. Business development management: production management and quality control, supply and inventory control, risk management, growth management, penetration of foreign markets, business promotion techniques, organizational management, change management.		4 hours
9.1.3. What is communication? The specifics of internal communication and its role in structuring organizational culture; Types of institutions and the internal communication circuit: temple institutions, Y institutions, star constellation institutions, linear institutions; Barriers in internal communication: formal communication versus informal communication (virtues, defects, imbalances, complementarity), hermeticism and secrecy, non-management of communication, flawed interpersonal and interdepartmental relationships, etc.; Internal communication, an essential factor in the solidarity of staff with the organization; Techniques and methods for correcting and improving organizational communication.		4 hours

9.1.4. Communication and leadership		2 hours

Course bibliography:

1. Sorina Raula Girboveanu, Dumitru Constantinescu, Comunicare organizationala, Editura: PRO UNIVERSITARIA, Bucuresti, 2021
2. Marc Helmold, Successful Management Strategies and Tools. Industry Insights, Case Studies and Best Practices, 1st ed., Springer Nature Switzerland AG, 2021
3. Ghenea M., Antreprenoriat. Drumul de la idei catre oportunitati si succes in afaceri, Editura Universul Juridic, Bucuresti, 2011
4. Thomas Klikauer, Management Communication. Communicative ethics and action, Palgrave Macmillan London, 2008

9.2c Project	Working methods [17]	Observations, Time allocation
9.2.c.1. Free debates with topics selected according to the target group (student group) in the field of management and industrial communication	Free discussions with specialists in the field active in the private sector or in state-owned enterprises	10 hours
9.2.c.2. Physical support of the project carried out with the theme of solving a management problem applying the principles of effective communication		3 hours
9.2.b.5. Final evaluation		1 hours

Bibliography for applied activities (seminar / laboratory / project):

1. Dan Candea, Rodica M, Candea, Comunicarea manageriala aplicata, Editura: Editura Expert, 1998

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method		10.3 Percentage of the final grade
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*	*50 %*	50%
		Summative assessment test (final evaluation).	*50 %*	
10.5c Laboratory	*Frequency / relevance of interventions or responses* *The quality of the realized project, the correctness of the project documentation, the justification of the chosen solutions*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium).*		50%

10.6 Conditions for passing

The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits. Supporting the activity is possible online and on site, depending on specific conditions. Also, the evaluation in all the forms included in the discipline file will be able to be performed in the on-site or online version depending on the epidemiological situation.

Date: 3.09.2025

Course instructor: Professor PhD Eng Daniela Șuteu

Course instructors for applied activities: Professor PhD Eng Daniela Șuteu

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name	Management of technology transfer						
2.1.2 Course code	514,3	2.1.3. Course category (Fundamental/Specialized/Complementary)					DS
2.2 Course instructor	Associate professor Claudia Cobzaru						
2.3 Course instructors for applied activities (S, L, P, Pr)	Associate professor Claudia Cobzaru						
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOP

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2	3.2 course	1	3.3a sem.	0	3.3b laboratory	0	3.3c project	1	3.3.d. practice	0
3.4 Total hours from curriculum[6]	28	3.5 course	14	3.6a sem.	0	3.6b laboratory	0	3.6c project	14		

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	25
Study in library and practical skills development	3
Preparation of seminars / laboratory works / project phases / home works / presentations	25
Evaluation[8]	4
Other activities:	

3.7 Total hours of individual study [9]	53
3.8 Total hours per semestre[10]	81
3.9 Number of credits	3

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	• Whiteboard, video projector, specific materials will be used. • Students will attend the course with their mobile phones closed; • It is not allowed to enter or leave the class during the course.
5.2 Project delivery requirements[13]	• Project hours take place in a classroom. • Students will solve/complete each project stage • During the project, students will have various materials, handheld calculators, writing instruments, sheets of paper, etc.

6. Overall objective of the course

The course aims to provide students with a fundamental understanding of the notions of technology transfer with a strong emphasis on applications that help generate and implement technological innovations. Within the project the students will acquire advanced knowledge about the notion of technology transfer and will put into practice an example of manufacturing a product that comes from scientific research.

7. Learning outcomes

Knowledge	The student / graduate: • describes the role of scientific research in the sustainable manufacture of industrial products. • explains the notions of technology transfer. • classifies the technology transfer channels, namely: trade in goods and services, licensing agreements, specialist travel, technology delivery from a parent company, university or other research units and firms. • applies into practice an example of manufacturing a product that comes from scientific research
Skills	The student / graduate: • uses the notions of technology transfer with a strong emphasis on applications that help generate and implement technological innovations • plans a product that comes from scientific research for technology transfer. • operates with different instruments of knowledge, relying on concrete tool sets stored in plans, databases, manuals, as well as other forms of documents, such as patents • critically evaluate the stages of a technology transfer with concrete examples.
Responsibility and autonomy	The student / graduate: - respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; - assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; - engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Introduction.Fundamental notions about the technology transfer.	*Interactive lecture* *Guided discussions* *Clarifying explanations*	2 hours
9.1.2. Chapter 1. Methods and models of technology transfer. Methodological and Technological problems in the Technology Transfer.		8 hours
9.1.3. Chapter 2. New Trends in Technology Transfer. Implications for National and International Policy.		4 hours
Course bibliography: 1. World Intellectual Property Organization (WIPO)A Primer on Technology Transfer in the Field of Biotechnology. Geneva: WIPO. 2025, DOI: 10.34667/tind.50126 2. de Assunção B.S.B., Dias C. N., Guillaumon S. Dechandt, Key Factors for a Successful Technology Transfer Process of Digital Innovation Assets, Triple Helix 11, 2024, 4-43. 3. Zahra F., Sayed M., Husseini H., A review of methods and models of technology transfer. International Letters of Social and Humanistic Sciences Online, 62, 2015, pp 173-181, ISSN: 2300-2697. 4. Barton J.H., New Trends in Technology Transfer. Implications for National and International Policy.18, ICTSD, Geneva, 2007. 5. Sandu S., Innovation, technological competence and economic growth, Expert Publishing House, Bucharest, 2002.		
9.2c Project	Working methods [18]	
9.2.1. Formation of working groups. Choice and acquisition of a chemical, pharmaceutical, cosmetic, food product, etc. that comes from scientific research.	Interactive lecture Guided discussions Clarifying explanations	2 hours
9.2.2. Stages of obtaining the product by collecting data starting from scientific research.		2 hours

9.2.3. Analysis of the collected data and interpretation of the results.		2 hours
9.2.4. Initiation of the technology transfer project in a real company.		2 hours
9.2.5. Cultural impact and performance of the absorption and implementation of the new product for the company.		2 hours
9.2.6. Conclusions and recommendations		2 hours
9.2.7. Final evaluation		2 hours
Bibliography for applied activities (seminar / laboratory / project): 1. Grosu R-G., Business management in technology transfer structures. Venus Publishing House, Iasi, 2004. 2. WIPO. Research and innovation issues in university-industry relations, 2002. 3. Government of Romania: Government Decision no. 406/2003 - Methodological norms of April 2, 2003 specific to the establishment, operation, evaluation and accreditation of entities in the innovation and technology transfer infrastructure. 4. Metz B., Davidson O. R., Martens J-W., van Rooijen Sascha N.M., Van Wie McGrory L., Methodological and Technological Issues in Technology Transfer, A Special Report of IPCC Working Group III, Published for the Intergovernmental Panel on Climate Change, Published by the Press Syndicate of the University of Cambridge, 2000.		

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final Exam	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*	-	60%
		Formative assessment test (ongoing evaluations throughout the semester).	-	
		Summative assessment test (final evaluation).	*100%*	
10.5a Seminar	*Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity*	*Active participation in activities;* *Assessment test.*		
10.5b Laboratory	*Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium).*		
10.5c Project	*Participation in the design activity, ability to conduct research,*	*Carrying out the design activity;* *Completion of the project;* *Project presentation/defense.*		40%

	application of knowledge in the design process.		

10.6 Conditions for passing
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date: 3.09.2025

Course instructor: Associate professor Claudia Cobzaru

Course instructors for applied activities: Associate professor Claudia Cobzaru

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,
Professor Teodor Malutan

Bachelor's / Master's degree.
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name	**Industrial Conference**						
2.1.2 Course code	515.1	2.1.3. Course category Fundamental/Specialized/Complementary)					DS
2.2 Course instructor	Associate professor Corina Cernătescu						
2.3 Course instructors for applied activities (S)	Associate professor Corina Cernătescu						
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	V	2.7 Course type [5]	DOP

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	3	3.2 course	2	3.3a sem.	1	3.3b laboratory	0	3.3c project	0	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	42	3.5 course	28	3.6a sem.	14	3.6b laboratory	0	3.6c project	0			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	4
Study in library and practical skills development	3
Preparation of seminars / laboratory works / project phases / home works / presentations	3
Evaluation[8]	2
Other activities:	

3.7 Total hours of individual study [9]	10
3.8 Total hours per semestre[10]	54
3.9 Number of credits	2

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used. Students must attend the course with their mobile phones turned off.
5.2 Laboratory requirements[13]	All student must be present at the seminary. The homework will be assigned at the the end of each seminary Students must come to the seminary with the completed homework from the previous sesion. Attendance at seminary sessions is mandatory.

6. Overall objective of the course

The course aims to provide students with the foundation to write and present papers at scientific conferences.

The students must also understand theoretical and practical concepts and principles specific to planning and interviewing for the best job in the field.

7. Learning outcomes

Knowledge	The student / graduate: - understand the theoretical and practical concepts and principles specific to planning and interviewing for the best job in the field - recognizes the specific requirements of a company for their employers. - classifies all personal and professional achievements in order to present the best CV. - outlines the best key pints that must be presented in a job interview. - summarizes the experimental data in order to write a material for an industril conference.

Skills	The student / graduate: - determine how to know and identify professions of interest. - analyse the consistency of data involving professional requirements for a job - critically evaluate the key points operational in an internship search process - evaluate different ways to ensure an employment by better performances at interviews - create solutions for specific problems in developing a professional network
Responsibility and autonomy	The student / graduate: - respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; - assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; - engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. ***Job hunting planning*** Searching and identifying the perfect job perfect for your educations and aims. Formulating and exploring the best strategy to ensure you got the job.	Interactive lecture Guided discussions Clarifying explanations	6 hours
9.1.2. ***How to write an attractive CV*** What you must write in a Europass CV. How to make your job experience look attractive. Aspects that must be included to increase the employer interest in you. How to write a good letter of interest.		6 hours
9.1.3. ***How to ace the job interview*** How to best prepare for the interview, including research of the employer field. How to answer difficult questions and how to avoid uncomfortable subjects. How to seem confident, intelligent, hard working etc. How to almost guaranty that you will be chosed for the job		8 hours
9.1.4. ***How to write a material for an industrial conference*** Searching and identifying the industrial conferences in the specific research field. Formulating the best strategy to write the most interesting materials with the experimental data available.		8 hours
Curse references: 1. ***, „How to Find a Job", : McGraw-Hill, 2009, ISBN: 9780071633178 2. Marky Stein, „ Fearless Interviewing: How to Win the Job by Communicating with Confidence", McGraw-Hill Publishing Co. 2003 3. Rebecca Corfield, „ Preparing the Perfect CV: How to Make a Great Impression and Get the Job You Want", Kogan Page Ltd, 2009. 4. Tony Beshara, „ Acing the Interview: How to Ask and Answer the Questions That Will Get You the Job", AMACOM, 2008. 5. Rebecca Corfield „Knockout Job Interview Presentations- How to Present with Confidence, Beat the Competition and Impress Your Way into a Top Job", KoganPage 2010. 6. Ros Jay „Brilliant Interview What Employers Want to Hear and How to Say It" Prentice Hall, 2011.		
9.2b Seminary	Working methods [17]	Observations, Time allocation
9.2.b.1. How to hunt your dream job. What is better? Internet or job fairs? How to find a job that is not yet available	Discussions of the strategy to find the best job vacancy in your field	2 hours
9.2.b.2. How to best write an Euro pass CV and Letter of interest	Each student will present their own CV and LI. Free discussions	6 hours
9.2.b.3. What do the employers want when they held an interview	Employers will be invited to present their point of view	2 hours

9.2.b.4. How to be best prepared for the job interview	Each student will undergo an interview in class	4 hours

References for seminary activities:

1. Brad Andrews, „ How to Land a Top-Paying Construction Managers Job", Emereo Pty Ltd, 2009.
2. Julie-Ann Amos, „ Write a Winning CV: Essential CV Writing Skills That Will Get You the Job You Want", How To Books Ltd., 2000.
3. Julie-Ann Amos, „ Be Prepared!: Getting Ready for Job Interviews", How to Books, 2007.

Julie-Ann Amos, „ Be Prepared! Pass That Job Interview!", How To Books Ltd, 2008.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method		10.3 Percentage of the final grade *(recommended to be proportional to the number of hours allocated to each type of activity)*
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*	*20 %*	60%
		Formative assessment test (ongoing evaluations throughout the semester).	*40 %*	
		Summative assessment test (final evaluation).	*40 %*	
10.5b Seminary	*Seminary activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of homework each session*		40%
10.6 Conditions for passing				
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date: 3.09.2025

Course instructor: Associate professor Corina Cernatescu

Course instructors for applied activities: Associate professor Corina Cernatescu

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Scientific English**			
2.1.2 Course code				515.2	2.1.3. Course category Fundamental/Specialized/Complementary)		Complementary
2.2 Course instructor							
2.3 Course instructors for applied activities (S)				Associate professor Mariana Mantu			
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	V	2.7 Course type [5]	DOP

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	3	3.2 course		3.3a sem.	2	3.3b laboratory		3.3c project	1	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	42	3.5 course		3.6a sem.	28	3.6b laboratory		3.6c project	14			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	2
Study in library and practical skills development	3
Preparation of seminars / laboratory works / project phases / home works / presentations	4
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	12
3.8 Total hours per semestre[10]	42
3.9 Number of credits	2

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	English for scientific purposes in approaching specialized texts (organic, biochemical and food engineering)

5. Requirements

5.1 Conditions for seminar delivery	Hall H4, (equipped with video projector, computer, blackboard, printed materials);
5.2	.

6. Overall objective of the course

Acquisition of communication skills according to the Common European Framework of Reference for Foreign Languages, development of written and oral communication skills in English in a technical university. Development of written and oral message reception skills in English, both in social, professional and technical contexts. The aim is to consolidate linguistic skills through the appropriate use of specialized vocabulary, correct grammatical structures and discursive strategies necessary for the efficient transmission of information for active collaboration with native and non-native speakers.

7. Learning outcomes

Knowledge	The student / graduate: -Understands and explains fundamental concepts and grammatical structures of the English language, adapted to the level of study; - Distinguishes and applies general and specialized vocabulary, relevant to the technical and scientific field; - Recognizes and uses conventions for writing academic and professional documents (reports, CVs, correspondence); - Identifies sources of linguistic information and lexical resources (dictionaries, databases, online corpora) and integrates them into the learning process; - Understands the mechanisms of receiving oral and written messages in English and the particularities of academic communication
Skills	The student / graduate: -Uses specific tools (printed and online dictionaries, specialized glossaries, linguistic databases) to verify and acquire general and specialized vocabulary; - Develops stylistically and grammatically appropriate texts, appropriate to the academic and professional context; - Operates with specialized vocabulary and linguistic structures in the writing and interpretation of technical documents; - Uses English correctly in oral and written communication, adapted to various situations (academic, professional, intercultural); - Writes technical texts, reports, summaries and academic presentations; - Actively participates in discussions, debates and group projects, demonstrating collaboration capabilities in intercultural contexts;
Responsibility and autonomy	The student / graduate: - Makes clear and structured oral presentations on general and specialized topics; - Interprets and synthesizes information; - Demonstrates responsibility in applying the language skills acquired in academic and professional contexts; - Assumes autonomy in learning and continuously improving the English language; - Demonstrates the ability to organize and manage individual writing and presentation tasks in English; - Collaborates effectively in teams, assuming various roles and responsibilities in joint projects; - Demonstrates initiative and adaptability in intercultural communication situations; - Integrates linguistic and cultural resources responsibly in the learning process and in professional development; - Demonstrates autonomy and critical thinking in receiving and interpreting messages in English.

8. Teaching methods

During teaching activity, specific textbooks for specialized languages in English and Power Point presentations will be used that will be made available to students. Presentations will contain images and syntheses, so that the information should be easily understood and assimilated. Teaching methods are also based on communicative learning models through discovery, facilitated by direct and indirect exploration of reality, but also on action-based methods, such as exercise, practical written and oral activities

9. Course content

	Teaching methods	**Time allocation**
9.2b Seminar and applied projects	Frontal, individual and group activity;	Time allocation

Specialized language in the field of chemistry; Applied texts in organic, biochemical and food engineering; Characteristics of Academic and Scientific Style in English; Formal/Informal Language Style; Preparation for a Scientific/Academic Presentation in English Linking words, passive voice, formal vocabulary, irregular plurals, word formation Preparing for a job interview in English; Final evaluation	worksheets, use of (semi)authentic document (printed, video or audio), situation and dialogue simulation, reading Working methods [17]	4 hours /topic 1hour per week/ project presentation
Seminar bibliography: Mark Ibbotson, *Cambridge English for Engineering*, Cambridge University Press, 2008 *English for Chemists*, http://www.upjs.sk/public/media/3499/English-for-Chemists.pdf, 2009 Raymond Murphy, *English Grammar in Use*, Cambridge University Press, 2003 Mark Nettle, Diana Hopkins, *Developing Grammar in Context*, Cambridge University Press, 2003		

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**	**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.5b Seminar	*Capacity of translating texts in Scientific English; Use of terms in the field in organic, biochemical and food engineering.*		50%
	Assessment tests ; Project presentation		50%
10.6 Conditions for passing			
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.			

Date: 3.09.2025

Course instructors for applied activities: Associate Professor Mariana Mantu

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernatescu

Date of approval by the Faculty Council: 8.09.2025

Dean,

Professor Teodor Malutan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*

[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*"Gheorghe Asachi" Technical University of Iasi*
1.2 Faculty	*"Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection*
1.3 Department	*Organic, Biochemical and Food Engineering*
1.4 Field	*Chemical Engineering*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name	**Molecular modelling**						
2.1.2 Course code	516	2.1.3. Course category Fundamental/Specialized/Complementary)					DC
2.2 Course instructor	Associate professor Epure Elena-Luiza						
2.3 Course instructors for applied activities (S, L, P, Pr)	Associate professor Epure Elena-Luiza						
2.4 Year of study [2]	1	2.5 Semesterl[3]	1	2.6 Evaluation type[4]	E	2.7 Course type [5]	DFA

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	3	3.2 course	2	3.3a sem.	0	3.3b laboratory	0	3.3c project	1	3.3.d. practice	0	
3.4 Total hours from curriculum[6]	42	3.5 course	28	3.6a sem.	0	3.6b laboratory	0	3.6c project	14			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Study in library and practical skills development	16
Preparation of seminars / laboratory works / project phases / home works / presentations	20
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	66
3.8 Total hours per semestre[10]	108
3.9 Number of credits	5

4. Prerequisites (optional)

4.1 curriculum[11]	-
4.2 learning outcomes	-

5. Requirements

5.1 Conditions for course delivery[12]	Whiteboard, video projector, specific materials will be used.
5.2 Laboratory requirements[13]	All computational work will be carried out using *Materials Studio* software on the laboratory computers. *Materials Studio* is provided under an institutional license and may only be used within the university facilities. Students must not install, uninstall, or modify any software on laboratory computers.

6. Overall objective of the course

The course aims to provide students with a foundational understanding of molecular modelling and computational simulation techniques in chemical and biochemical process technology. Students will gain advanced insights into quantum mechanical methods, molecular mechanics, molecular dynamics, and stochastic simulation approaches, with applications ranging from molecular and mesoscopic systems to process-scale modelling. The course emphasizes multiscale modelling, integration of data-driven and machine learning approaches, and the use of computational methods to predict material and solvent properties, optimize processes, and validate models in industrial and research contexts.

7. Learning outcomes

Knowledge	The student / graduate: - describes the role of molecular modelling and simulation in chemical and biochemical process technology, across molecular, mesoscopic, and macroscopic levels; - explains the fundamental principles of quantum mechanical methods, molecular mechanics, force fields, and molecular dynamics as applied to reactive systems, materials, and solvents; - recognizes the basis and applications of stochastic simulation methods, including Monte Carlo, in chemical and biochemical engineering; - outlines the principles and strategies of multiscale modelling, linking atomistic, mesoscopic, and process-scale approaches; - identifies challenges and best practices in case studies, including scale-up and model validation in industrial applications.
Skills	The student / graduate: - applies molecular modelling techniques to predict physical, chemical, and biochemical properties of systems; - analyses and interprets results obtained from computational simulations (QM, MD, MC, mesoscopic models); - critically evaluates the suitability of different modelling approaches (molecular, mesoscopic, macroscopic) for specific engineering problems; - develops problem-solving strategies using process simulation, multiscale modelling, and machine learning approaches.
Responsibility and autonomy	The student / graduate: - respects ethical principles and academic integrity in the use of software, licensed resources, and computational data; - assumes responsibility for accurate, reproducible, and validated modelling results in both academic and industrial contexts; - engages in continuous professional development in computational modelling by appropriately using effective lifelong learning methods and staying updated with modern simulation tools.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Molecular modelling and simulation in chemical and biochemical process technology. Levels of modelling: molecular, mesoscopic, macroscopic	Interactive lecture Guided discussions Clarifying explanations	4 hours
9.1.2. Molecular modelling in process engineering. Quantum mechanical methods applied to reactive systems. Molecular mechanics and force fields. Molecular dynamics in predicting material and solvent properties		8 hours
9.1.3. Monte Carlo and stochastic simulation methods		3 hours
9.1.4. Multiscale modelling approaches		3 hours
9.1.5. Data-driven modelling and machine learning in process technology		4 hours
9.1.6. Case studies and applications. Scale-up challenges and model validation		6 hours

Course bibliography:

1. K. Verma, Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering, , CRC Press, 2015
2. Callister Jr., W.D., Fundamentals of Materials Science and Engineering, Wiley International Edition, John Wiley and Sons, Inc. 2005.
3. Allen M P, Tildesley D J, Computer Simulation of Liquids, Clarendon Press Oxford, New York, 1991.
4. Allen M P, Wilson M R, Computer simulation of liquid crystals, J. Comp. Aided Mol. Des., 3, 4, 335-53, doi: 10.1007/BF01532020, 1989
5. Bicerano J, Prediction of Polymers Properties, Marcel Dekker, New York, ISBN 0-8247-0821-0, 2002.
6. W. Atkins, R. S. Friedman, Molecular Quantum Mechanics, Oxford University Press, Ney York, 2000
7. W. Atkins, R. S. Friedman, Solution manual for Molecular Quantum Mechanics, Oxford University Press, Ney York, 1997
8. G. F. Barreto, C D Luzi, Applying multiple-reaction stoichiometry to chemical reactor modelling, Synthesis Lectures on Chemical Engineering & Biochemical Engineering, Springer, 2024

9.2b Laboratory	Working methods [17]	Observations, Time allocation
9.2.b.1. Modeling software: getting started with using Materials Studio, Discovery (Biovia) and open-source simulation softwares	Practical demonstrations,	4 hours
9.2.b.2 Theoretical calculations of chemical reactivity		4 hours

9.2.b.3. Conformational analyze of organic compounds. Minimization energy and balancing structures through molecular dynamics simulations..	exercises, experiments	6 hours

Bibliography for applied activities (seminar / laboratory / project):

1. Allen M P, Wilson M R, Computer simulation of liquid crystals, J. Comp. Aided Mol. Des., 3, 4, 335-53, 1989
2. Allen M P, Tildesley D J, Computer Simulation of Liquids, Clarendon Press Oxford, New York, 1991.
3. Bicerano J, Prediction of Polymers Properties, Marcel Dekker, New York, ISBN 0-8247-0821-0, 2002.
4. Rigby D., Roe R.-J, Molecular dynamics simulation of polymer liquid and glass. II. Short range order and orientation correlation, J. Chem. Phys, 89, 8, 5280-9, doi: 10.1063/1.455619, 1988.
5. W. Atkins, R. S. Friedman, Molecular Quantum Mechanics, Oxford University Press, Ney York, 2000
6. V. Yadav, A. Kumar, P. Jha, Machine learning applications in chemical process simulation and design, Chemical Engineering Research and Design, 2020, 160, pp. 64–80

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method		10.3 Percentage of the final grade
10.4 Type of evaluation: Final Exam / Assessment	Completeness and correctness of knowledge. Logical coherence, fluency, strength of argumentation. Capacity for analysis, personal interpretation, originality, creativity. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Systematic observation of students (case study).	20%	60%
		Formative assessment test (ongoing evaluations throughout the semester).	40%	
		Summative assessment test (final evaluation).	40%	
10.5b Laboratory	Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts. Capacity for analysis, personal interpretation, originality, and creativity.	Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work)		40%
10.6 Conditions for passing				
Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date: 3.09.2025

Course instructor: Associate professor Epure Elena-Luiza

Course instructors for applied activities: Epure Elena-Luiza

Date of approval by the department: 5.09.2025

Head of Department
Associate professor Corina Cernătescu

Date of approval by the Faculty Council: 8.09.2025

Dean,
Professor Teodor Măluțan

[1] *Bachelor's / Master's degree.*
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*

[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Chemical and Environmental Engineering
1.4 Field	Chemical Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name				**Analysis and Synthesis of Chemical Processes**			
2.1.2 Course code				MINQUI01-1-17	2.1.3. Course category Fundamental/Specialized/Complementary		S
2.2 Course instructor				Paula Oulego Blanco			
2.3 Course instructors for applied activities (S, L, P, Pr)				Paula Oulego Blanco			
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2.5	3.2 course	1.5	3.3a sem.	0.5	3.3b laboratory		3.3c project	0.5	3.3.d. practice	
3.4 Total hours from curriculum[6]	35	3.5 course	21	3.6a sem.	7	3.6b laboratory		3.6c project	7		

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Practical skills development	28
Preparation of seminars / laboratory works / project phases / home works / presentations	25.5
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	86.5
3.8 Total hours per semestre[10]	121.5
3.9 Number of credits	4.5

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector, optimization software (EXCEL, GAMS or similar)

6. Overall objective of the course

This course aims to study in depth the synthesis and design of a process, addressing different strategies for the selection and sizing of equipment. Special attention will be paid to economic, quality, energy saving, safety and waste minimization aspects.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Be able to formulate and solve complex problems in the fields of process and product design.
Skills	The student / graduate will: 2. Be able to evaluate and make decisions about new designs or improvements of existing ones. 3. Be able to apply different strategies for addressing uncertainty and scale-up issues in the design of chemical processes.
Responsibility and autonomy	The student / graduate will: 4. Be able to integrate policies about energy saving, resources optimization, sustainability, safety and environmental issues in the stage of synthesis of a chemical process.

8. Teaching methods

Lectures are focused on theoretical or practical activities given in a fundamentally expository way, and supported by graphic material made available to students in advance. Lectures are complemented with practical activities with a high degree of student participation: seminar and project sessions. The seminars are focused on practical learning through problem-solving and practical exercises. Project sessions are dedicated to analyse practical cases in student groups to promote the development of transversal abilities related to team work, oral and written communication, take decisions under conditions of uncertainty considering ethical and social responsibilities, etc.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Analysis and synthesis of processes. Hierarchical strategies and global optimization for decision making. Advanced calculation tools.	Interactive lecture. Clarifying explanations.	6 hours
9.1.2. Synthesis and optimization of processes: Pinch technology. Heat exchanger networks and integration of reaction, separation and auxiliary systems.		4 hours
9.1.3. Economic optimization of processes. Production planning.		4 hours
9.1.4. Integration of safety and environment in the design of processes.		4 hours
9.1.5. Design in the presence of uncertainty. Sizing and scaling		3 hours
Course bibliography: *Books:* Biegler, L.T., Grossmann, I.E., Westerberg, A.W., "Systematic Methods of Chemical Process Design", Prentice Hall, Nueva Jersey (1997). El-Halwagi. M.M. Process Integration. Elsevier B.V., Amsterdam (2006). Seider, W.D., Seader, J.D., Lewin, D.R., Widagdo, S., "Product and Process Design Principles: Synthesis, Analysis and Design", John Wiley & Sons, Nueva York (2008). Smith, R., "Chemical Process Design and Integration", John Wiley & Sons, Ltd., West Sussex (2005).		
9.2a Seminar	**Working methods** [16]	**Time allocation**
Problem solving of optimization and process design.	Exercises and problem solving	7 hours
9.2b Project	**Working methods** [16]	**Time allocation**
Practical cases of analysis and synthesis of chemical processes. Practical cases of integration of heat integration in reaction, separation and auxiliary systems.	Work in groups of students to address and discuss practical cases.	7 hours
Bibliography for applied activities (seminar / laboratory / project): Same bibliography as courses.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade
10.4 Final Exam	Completeness and correctness of knowledge. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Summative assessment test (final evaluation).	40%
10.5a Seminar	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities. Assignments.	30%
10.5b Project	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities.	30%

10.6 Conditions for passing
Grades from 0 to 10 points will be awarded to each activity of the course. The score of the Final Exam must be, at least, 4 points and the score of the Seminar and Project activities, at least, 5 points. The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Paula Oulego Blanco

Course instructors for applied activities: Paula Oulego Blanco

Date of approval by the department:

Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council:

Dean, José Javier Borge Álvarez

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Chemical and Environmental Engineering
1.4 Field	Chemical Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name				**Safety and Hazard Analysis**			
2.1.2 Course code				MINQUI01-1-007	2.1.3. Course category Fundamental/Specialized/Complementary		S
2.2 Course instructor				Fernando Díez Sanz			
2.3 Course instructors for applied activities (S, L, P, Pr)					Fernando Díez Sanz		
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2.5	3.2 course	1.8	3.3a sem.	0.7	3.3b laboratory		3.3c project		3.3.d. practice		
3.4 Total hours from curriculum[6]	35	3.5 course	25	3.6a sem.	10	3.6b laboratory		3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	40
Practical skills development	28
Preparation of seminars / laboratory works / project phases / home works / presentations	15.5
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	86.5
3.8 Total hours per semestre[10]	121.5
3.9 Number of credits	4.5

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector

6. Overall objective of the course

The course aims to provide students with a foundational understanding of process and personal safety, and a practical application of techniques like HAZOP, fault tree and consequence analysis.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Be aware of hazards in the chemical and processing industry, being able to evaluate risks in specific situations. 2. Have a knowledge and understanding of procedures for improving safety in equipment and operations of the chemical and process industry, with a view on the improvement of new equipment and operations design.
Skills	The student / graduate will: 3. Be able to identify and assess event entity and probability, and expertly handle qualitative and quantitative risk analysis tools (HAZOP, fault tree analysis). 4. Be able to quantitatively assess the consequences of accidents, fires, explosions, spills and toxic emissions.
Responsibility and autonomy	The student / graduate will: 5. Be aware of legislation, technical standards and good practices in safety, considering ethical implications, and understand the liabilities of companies in the prevention of accidents in the industry (Occupational Hazards Prevention Act, Seveso directives, etc).

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. The teaching method is also based on action-based methods, such as practical exercises, problem-solving, conference of professionals in the field, visits to companies, etc.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Hazards in the chemical and process industries	Interactive lecture. Clarifying explanations. Conferences of professionals in the field.	2 hours
9.1.2. Occupational Health: Physical hazards		2 hours
9.1.3. Occupational Health: Chemical and Biological hazards		2 hours
9.1.4. Industrial safety		3 hours
9.1.5. Fires and explosions		2 hours
9.1.6. Storage and transport of chemicals		2 hours
9.1.7. Safety analysis techniques: HAZOP and Fault Tree Analysis		4 hours
9.1.8. Consequence analysis		4 hours
9.1.9. Operational safety techniques		2 hours
9.1.10. Other accidents		2 hours
Course bibliography: (This section should include reference titles and materials developed by the course coordinator(s), available in printed and/or electronic format. Emphasis should be placed on materials published or updated in recent years.) *Books:* HAUPTMANNS. U. "Process and Plant Safety", Springer, Berlin, 2015. *Webpages:* European Agency for Safety and Health at Work, https://osha.europa.eu/en U.S. Occupational Safety and Health Administration, https://www.osha.gov/ U.S. Chemical Safety Board, https://www.csb.gov/ UK Health and Safety Executive, https://www.hse.gov.uk/ Instituto de Seguridad y Salud en el Trabajo (España) https://www.insst.es/ Dirección General de Protección Civil y Emergencias (España), ttps://www.proteccioncivil.es/		
9.2a Seminar	**Working methods** [16]	**Time allocation**
Occupational Health. Industrial safety. HAZOP and Fault Tree Analysis. Consequence analysis.	Exercises and problem solving	10 hours
Bibliography for applied activities (seminar / laboratory / project): Same bibliography as courses.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade
10.4 Final Exam	Completeness and correctness of knowledge. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Summative assessment test (final evaluation).	70%
10.5a Seminar	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities. Assignments.	30%

10.6 Conditions for passing

Grades from 0 to 10 points will be awarded to each activity of the course. The Final Exam has two parts, theory and solution of numerical problems, each part weighting 50 % of the exam score. The score of the Final Exam must be, at least, 4 points, and the score of each part of the exam (theory and numerical problems) must be at least 30 % (i.e. 1.5 points for each part). The score of the Seminar, must be at least 5 points. The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Fernando Díez Sanz

Course instructors for applied activities: Fernando Díez Sanz

Date of approval by the department:

Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council:

Dean, José Javier Borge Álvarez

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Business Administration
1.4 Field	Business Organization
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name				**Research and Innovation Management**			
2.1.2 Course code				MINQUI01-1-016	2.1.3. Course category Fundamental/Specialized/Complementary		S
2.2 Course instructor				Silvia María González Fernández			
2.3 Course instructors for applied activities (S, L, P, Pr)				Silvia María González Fernández			
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	1.6	3.2 course	1	3.3a sem.		3.3b laboratory		3.3c project	0.6	3.3.d. practice		
3.4 Total hours from curriculum[6]	22	3.5 course	14	3.6a sem.		3.6b laboratory		3.6c project	8			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	22
Practical skills development	20
Preparation of seminars / laboratory works / project phases / home works / presentations	15
Evaluation[8]	2
Other activities:	

3.7 Total hours of individual study [9]	59
3.8 Total hours per semestre[10]	81
3.9 Number of credits	3

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector

6. Overall objective of the course

This course is conceived to provide students with a general background on the management of technological firms from a theoretical and practical perspective focusing on research and development (R&D) processes.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Have a thorough understanding of current technologies and their limitations, and be aware of opportunities for new and emerging technologies in industrial processes.
Skills	The student / graduate will: 2. Be able to manage innovation and research in technological environments: transfer of results, intellectual property, innovation budgets, application projects, etc.
Responsibility and autonomy	The student / graduate will: 5. Be competent in the preparation of technical reports in compliance with guidelines, i.e. audits and certifications.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. The teaching method is also based on projects in which the students will be involved into the development and formal elaboration of a R&D project proposal. This activity will be carried out in groups of students to contribute in the development of transversal skills, such as team-working, leadership, oral and written communication skills, etc.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Firm competitiveness and Research and Development.	Interactive lecture. Clarifying explanations. Conferences of professionals in the field.	3 hours
9.1.2. Technological innovation and transformation.		4 hours
9.1.3. Science and technology, from a research-based perspective and designing research project proposals.		4 hours
9.1.4. Technological diffusion, first mover and followers. Financing strategy.		3 hours
Course bibliography: *Books:* SCHILLING, M.A. (2005 or newer): Strategic Management of Technological Innovation; Mc Graw Hill; Boston. FERNÁNDEZ SÁNCHEZ, E. (2005): Estrategia de Innovación, Thomson, Madrid.		
9.2a Project	**Working methods** [16]	**Time allocation**
Develop a R&D project proposal working in groups of students	Analysis and discussion of cases	8 hours
Bibliography for applied activities (seminar / laboratory / project): Same bibliography as courses.		

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**	**10.3 Percentage of the final grade**
10.4 Final Exam	Completeness and correctness of knowledge. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Summative assessment test (final evaluation).	40%
10.5a Project	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Cases completed in class. Group assignment.	60%
10.6 Conditions for passing			

Grades from 0 to 10 points will be awarded to each activity of the course. The score of the Final Exam must be, at least, 4 points and the score of the Project activity, at least, 5 points.
The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Silvia María González Fernández

Course instructors for applied activities: Silvia María González Fernández

Date of approval by the department: Head of Department: Lucía Avella Camarero

Date of approval by the Faculty Council: Dean, José Javier Borge Álvarez

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Chemical and Environmental Engineering
1.4 Field	Environmental Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name	**Pollution Prevention and Sustainable Technologies**						
2.1.2 Course code	MINQUI01-1-014	2.1.3. Course category Fundamental/Specialized/Complementary	S				
2.2 Course instructor	Salvador Ordóñez García						
2.3 Course instructors for applied activities (S, L, P, Pr)	Laura Faba Peón						
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2.5	3.2 course	1.5	3.3a sem.		3.3b laboratory		3.3c project	1	3.3.d. practice		
3.4 Total hours from curriculum[6]	35	3.5 course	21	3.6a sem.		3.6b laboratory		3.6c project	14			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	35
Practical skills development	23
Preparation of seminars / laboratory works / project phases / home works / presentations	25.5
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	86.5
3.8 Total hours per semestre[10]	121.5
3.9 Number of credits	4.5

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector

6. Overall objective of the course

The course aims to provide students with knowledge about strategies for pollution reduction in chemical processes, as well as the fundamentals of green chemistry and engineering. Industry experts will be invited to provide practical insights into how these principles are implemented in real-world scenarios.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Be aware of assessment and evaluation of process design alternatives with respect to process safety and environmental impact, aiming to promote a sustainable development.
Skills	The student / graduate will: 2. Be able to apply core chemical engineering knowledge, together with creativity and critical thinking, to develop design alternatives to process units in order to minimize the environmental impact of the overall process. 3. Be able to apply Green Chemistry and Clean Technology approaches to environmental impact minimization of a manufacturing process.
Responsibility and autonomy	The student / graduate will: 4. Be competent in the synthesis and integration of the different elements of a process flowsheet, in order to minimize the overall environmental impact of the facility.

8. Teaching methods

The lectures will include theoretical and practical activities imparted by the lecturer and using the material previously given to students. Seminars will be mainly practical activites with a high and active participation of students. At the beginning of the course, students recieve a copy of all the material that will be used during the sessions, and the problems that must be solved as individual or group work. The lectures will be complemented with activities in collaboration with industry experts to provide practical insights on the application of pollution prevention principles.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Introduction. Corrective and preventive approaches. Legal aspects (IPPC, REACH, etc.). Sustainability: concept and metrics.	Interactive lecture. Clarifying explanations. Conferences of professionals in the field.	2 hours
9.1.2. Environmental impact assessment of the chemical processes.		2 hours
9.1.3. Methodology of pollution prevention: prevention plans.		2 hours
9.1.4. Application of the Principles of Green Chemistry to the chemical industry. Strategies to minimize the environmental impact of a chemical reaction.		2 hours
9.1.5. Pollution prevention in the raw materials selection: decarbonization and hydrogen economy.		2 hours
9.1.6. Pollution prevention by integration of chemical processes: Flow diagrams analysis and industrial ecology.		2 hours
9.1.7. Reactors design for pollution prevention.		2 hours
9.1.8. Pollution prevention in separation units.		2 hours
9.1.9. New technologies for pollution prevention: process intensification.		1 hours
9.1.10. Case studies of pollution prevention: pharmaceutical, paper-mill, carbochemical plants.		4 hours
Course bibliography: *Books:* D.T. Allen, D.R. Shonnard, "Green Engineering: Environmentally Conscious Design of Chemical Processes", Prentice Hall (2002) N.P. Cheremisinoff, P. Rosenfeld, "Responsible Care: A new strategy for pollution prevention and waste remediation through Environmental Management" Gulf Pub (2008) F. Cavani, G. Centi, S. Perathoner, "Sustainable Industrial Chemistry" WileyVCH (2009) A.E. Martel-Parrish, "Green Chemistry and Engineering", Wiley-AIChE (2014) A.P. Rossiter, "Waste minimization through Process Design", Mc Graw Hill (1995) M. Lancaster "Green Chemistry: An introductory text", Ed. RSC (2002)		

9.2a Project	Working methods [16]	Time allocation
Practical case projects on the implementation of pollution prevention principles on industrial processes, addressing: - impact assessment. - integration of chemical processes, and reactor and separation design for pollution prevention.	Discuss and work on practical case projects.	14 hours
Bibliography for applied activities (seminar / laboratory / project): Same bibliography as courses.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade
10.4 Final Exam	Completeness and correctness of knowledge. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Summative assessment test (final evaluation).	60%
10.5a Project	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities. Assignments.	40%

10.6 Conditions for passing
Grades from 0 to 10 points will be awarded to each activity of the course. The score of the Final Exam must be, at least, 4 points and the score of the Seminar, at least, 5 points. The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Salvador Ordóñez García

Course instructors for applied activities: Laura Faba Peón

Date of approval by the department: Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council: Dean: José Javier Borge Álvarez

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Chemical and Environmental Engineering
1.4 Field	Environmental Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name				**Advanced Pollution Control Technologies**			
2.1.2 Course code				MINQUI01-1-010	2.1.3. Course category Fundamental/Specialized/Complementary		S
2.2 Course instructor				Laura Faba Peón			
2.3 Course instructors for applied activities (S, L, P, Pr)					Laura Faba Peón		
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2.5	3.2 course	1.3	3.3a sem.	0.5	3.3b laboratory	0.7	3.3c project		3.3.d. practice		
3.4 Total hours from curriculum[6]	35	3.5 course	18	3.6a sem.	7	3.6b laboratory	10	3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	35
Practical skills development	23
Preparation of seminars / laboratory works / project phases / home works / presentations	25.5
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	86.5
3.8 Total hours per semestre[10]	121.5
3.9 Number of credits	4.5

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector, computer room, software for the simulation of water treatment plants (GPS-X)

6. Overall objective of the course

The course aims to provide students with knowledge about the best available techniques for treating gas streams, liquid streams and wastes of the main industrial sectors, under the common perspective of prevention and integrated pollution control.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Be aware of the currently available technologies for the treatment of gaseous emissions, wastewaters, wastes and polluted soils. 2. Be able to apply the knowledge of effluent treatments to unusual sources of pollution.
Skills	The student / graduate will: 3. Have a knowledge and understanding of the design and implementation of new technologies for pollution treatment
Responsibility and autonomy	The student / graduate will: 4. Be able to select the best available techniques (BAT) for the treatment of common pollutants

8. Teaching methods

The lectures are devoted to theoretical or practical activities taught by the lecturer and supported by visual material that will be made available to the students in advance. The seminar and laboratory activities are designed to complement the lectures with the analysis and discussion of practical cases (group discussions, assessments, etc.) and visits to industrial facilities.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Best Available Techniques and Emission Limits.	Interactive lecture. Clarifying explanations. Conferences of professionals in the field.	2 hours
9.1.2. Advanced Treatment of Air Pollution. Treatment of gases from combustion processes: particulate pollution, SO_2 and NO_x pollution Elimination of dioxins and incomplete combustion products Treatment of gases from low-temperature processes (VOCs) Management and treatment of CO_2 and other greenhouse gas emissions Treatment of Air Pollution in thermoelectric power generation processes Treatment of Air Pollution in cement manufacturing processes		8 hours
9.1.3. Advanced Treatment of Water Pollution. Waters with oils and hydrocarbons Waters with high nutrient concentrations: biological membrane reactors Waters with inorganic species and metals: chemical and electrochemical processes for metal removal Emerging pollutants: environmental issues and treatment Design, operation, and maintenance of wastewater treatment plants		8 hours
9.1.4. Soil Management and Recovery. Determination of soil pollution Soil decontamination treatment: soil confinement, physical-chemical and biological techniques Integrated management of air, water, and soil pollution.		7 hours
Course bibliography: Best Available Techniques (BAT) reference documents, European Bureau for Research on Industrial Transformation and Emissions (EU-BRITE), https://bureau-industrial-transformation.jrc.ec.europa.eu/reference		
9.2a Seminar	**Working methods** [16]	**Time allocation**
Practical cases on analysis, selection and design of the best available techniques for the treatment of a given set of pollutants and process.	Exercises and problem solving. Discuss practical cases.	7 hours

9.2b Laboratory	Working methods [16]	Time allocation
Laboratory experiments and demonstrations. Visits to industrial facilities and pilot plants.	Laboratory experiments and visits to industries.	10 hours
Bibliography for applied activities (seminar / laboratory / project): Same bibliography as courses.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade
10.4 Final Exam	Completeness and correctness of knowledge. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Summative assessment test (final evaluation).	60%
10.5a Seminar 10.5b Laboratory	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities. Assignments.	40%

10.6 Conditions for passing
Grades from 0 to 10 points will be awarded to each activity of the course. The score of the Final Exam must be, at least, 4 points and the score of the Seminar, at least, 5 points. The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Laura Faba Peón

Course instructors for applied activities: Laura Faba Peón

Date of approval by the department: Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council: Dean: José Javier Borge Álvarez

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Chemical and Environmental Engineering
1.4 Field	Chemical Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name	**Emulsion and Suspension Technology**						
2.1.2 Course code	MINQUI01-1-11	2.1.3. Course category Fundamental/Specialized/Complementary	S				
2.2 Course instructor	Gemma Guitierrez Cervelló						
2.3 Course instructors for applied activities (S, L, P, Pr)	María Matos González						
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2.5	3.2 course	1.3	3.3a sem.	0.5	3.3b laboratory	0.7	3.3c project		3.3.d. practice		
3.4 Total hours from curriculum[6]	35	3.5 course	18	3.6a sem.	7	3.6b laboratory	10	3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Practical skills development	28
Preparation of seminars / laboratory works / project phases / home works / presentations	25.5
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	86.5
3.8 Total hours per semestre[10]	121.5
3.9 Number of credits	4.5

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector, laboratory facilities

6. Overall objective of the course

This course aims to study the design of operations in which emulsions, suspensions and colloidal systems are processed.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Have a knowledge and understanding of interface phenomena in multiphase systems. 2. Be able to identify the key characteristics of surfactants, emulsions and other colloidal systems, as well as their main industrial applications.
Skills	The student / graduate will: 3. Be able to explain the behaviour of emulsions and suspensions in different processes, in terms of their stability and interfacial properties.
Responsibility and autonomy	The student / graduate will: 4. Be able to select the appropriate technological processes for the treatment and management of emulsions and suspensions.

8. Teaching methods

Lectures are focused on theoretical or practical activities given in a fundamentally expository way, and supported by graphic material made available to students in advance. Lectures are complemented with practical activities with a high degree of student participation: seminar and laboratory sessions. The seminars are focused on practical learning through problem-solving and the analysis of practical case studies of industrial application. Laboratory sessions are dedicated to conduct laboratory experiments about the techniques of preparation and characterization of colloidal systems, emulsions and suspensions. The students will work in groups under the supervision of a lecturer.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Interfacial phenomena in polyphase systems.	Interactive lecture. Clarifying explanations.	2 hours
9.1.2. Surfactants: types and applications.		3 hours
9.1.3. Emulsions: fundamentals, formulation and applications.		3 hours
9.1.4. Suspensions: fundamentals, formulation and applications.		3 hours
9.1.5. Nanoparticles fundamentals, formulation and applications.		2 hours
9.1.6. Encapsulation with colloidal system for bioapplications		3 hours
9.1.7. Environmental problems of residual emulsions and suspensions.		2 hours
Course bibliography: *Books:* Rosen, M.J., Surfactants and Interfacial Phenomena, 3rd ed. John Wiley (2004) Holmberg, K. Jonsson, B.; Kronberg, B.; Lindman, B., Surfactants and Polymers in Aqueous Solutions, John Wiley (2003) M. Matos, D. Pando, G. Gutiérrez, Nanoencapsulation of Food Ingredients by Niosomes In Lipid Base Nanoestructures for Food fortification purpose, Elsevier (2019), chapter 11, pages 447-481. M. Matos, R. Díaz, A. Marefati, M. Rayner, G. Gutiérrez, Encapsulation of antioxidants using double emulsions in Food Bioactive Ingredients. Springer (2021), chapter 7. G. Gutiérrez, M. Matos, C. Pazos. Simple emulsion. Encyclopaedia of Membranes, Springer (2014) M. Matos, G. Gutiérrez, C. Pazos. Membrane emulsification and chemical applications. Encyclopaedia of Membranes Springer (2014)		
9.2a Seminar	**Working methods** [16]	**Time allocation**
Problem solving. Discussion of practical case studies of industrial use.	Exercises and problem solving	7 hours
9.2b Laboratory	**Working methods** [16]	**Time allocation**
Experiment 1. Preparation of colloidal systems using surfactants. Experiment 2. Preparation of emulsions Experiment 3. Preparation of suspensions	Work at the laboratory in groups of students guided by a lecturer.	10 hours
Bibliography for applied activities (seminar / laboratory / project): Same bibliography as courses.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade
10.4 Final Exam	Completeness and correctness of knowledge. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Summative assessment test (final evaluation).	50%
10.5a Seminar	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities. Assignments.	25%
10.5b Laboratory	Ability to apply learned knowledge in practice. Ability to plan, conduct and interpret laboratory experiments.	Active participation in activities. Report of the laboratory activities.	25%

10.6 Conditions for passing
Grades from 0 to 10 points will be awarded to each activity of the course. The score of the Final Exam must be, at least, 4 points and the score of the Seminar and Laboratory activities, at least, 5 points. The Final Evaluation of the module is determined by considering the scores and weights assigned to each activity within the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: Gemma Guitierrez Cervelló

Course instructors for applied activities: María Matos González

Date of approval by the department:

Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council:

Dean, José Javier Borge Álvarez

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	University of Oviedo
1.2 Faculty	Faculty of Chemistry
1.3 Department	Chemical and Environmental Engineering
1.4 Field	Chemical Engineering
1.5 Study level	Master
1.6 Specialization	Chemical and Biochemical Process Technology - CBPT

2. Course information

2.1.1 Course name				**Seminars on Circular Economy**			
2.1.2 Course code					2.1.3. Course category Fundamental/Specialized/Complementary		S
2.2 Course instructor				Salvador Ordóñez García			
2.3 Course instructors for applied activities (S, L, P, Pr)					Salvador Ordóñez García Laura Faba Peón		
2.4 Year of study [2]	1	2.5 Semester[3]	2	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2.5	3.2 course	2.5	3.3a sem.		3.3b laboratory		3.3c project		3.3.d. practice		
3.4 Total hours from curriculum[6]	35	3.5 course	35	3.6a sem.		3.6b laboratory		3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	25
Practical skills development	28
Preparation of seminars / laboratory works / project phases / home works / presentations	30.5
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	86.5
3.8 Total hours per semestre[10]	121.5
3.9 Number of credits	4.5

4. Prerequisites (optional)

4.1 Curriculum[11]	
4.2 Learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector

6. Overall objective of the course

The course aims to provide students knowledge about the scope of Circular Economy and its application in the food, biotechnology, material and chemical industries.

7. Learning outcomes

Knowledge	The student / graduate will: 1. Have a knowledge and understanding of the scope of Circular Economy and its impact in the Chemical and Process industries.
Skills	The student / graduate will: 2. Be able to apply Circular Economy management tools to assess the environmental impact of process and products. 3. Be able to identify improvements in the process, raw materials and products to reduce the environmental impact of Chemical and Process industries.
Responsibility and autonomy	The student / graduate will: 4. Be aware of legislation, technical standards and good practices to reduce the environmental impact of process and products.

8. Teaching methods

The teaching process will involve participatory seminars and debates with professionals from industries, research centres and public administration. These professionals will present case studies of practical implementation of the Circular Economy principles in their respective fields (e.g., food, biotechnology, material and chemical industries). The module will be completed with visits to selected facilities (industries and/or research centres).

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.2a Seminar	**Working methods** [16]	**Time allocation**
Circular Economy: origin and evolution of the concept Waste recycling and Circular Economy Tools for Circular Economy Innovation towards a real industrial symbiosis Case studies of Circular Economy in the chemical and process industries (oil, petrochemical, food, biotechnology, material, etc.) Visit to industrial facilities	Conferences of professionals in the field.	35 hours

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**	**10.3 Percentage of the final grade**
10.5a Seminar	Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity	Active participation in activities. Assignments.	100%
10.6 Conditions for passing			
Grades from 0 to 10 points will be awarded to each activity of the course. A minimum grade of 5 certifies the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.			

Date:

Course instructor: Salvador Ordóñez García

Course instructors for applied activities: Salvador Ordóñez García

Date of approval by the department: Head of Department: Manuel Rendueles de la Vega

Date of approval by the Faculty Council: Dean, José Javier Borge Álvarez

---

Bachelor's / Master's degree.
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study.*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – EXTENDED FORM

Academic year 2026 – 2027

1. Program information

1.1 University	*Université de Rouen Normandie (URN)*
1.2 Faculty	
1.3 Department	*UFR Sciences et Techniques – Department of Biology*
1.4 Field	*Microbiology*
1.5 Study level	*Master 2*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Microbial Ecology for Biotechnology (sub-courses of UE Microbial Ecology, M1 Microbiology Health, Well-being and Industry)**			
2.1.2 Course code					2.1.3. Course category Fundamental/Specialized/Complementary)		S
2.2 Course instructor				Yannick Colin, Marion Gueganton, Thierry Berthe			
2.3 Course instructors for applied activities (S, L, P, Pr)				n/a			
2.4 Year of study [2]	2	2.5 Semesterl[3]	3	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	1	3.2 course	1	3.3a sem.		3.3b laboratory		3.3c project		3.3.d. practice	
3.4 Total hours from curriculum[6]	14	3.5 course	16	3.6a sem.		3.6b laboratory		3.6c project			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Study in library and practical skills development	29
Preparation of seminars / laboratory works / project phases / home works / presentations	29
Evaluation[8]	2
Other activities:	

3.7 Total hours of individual study [9]	90
3.8 Total hours per semestre[10]	120
3.9 Number of credits	4

4. Prerequisites (optional)

4.1 curriculum[11]	A solid understanding of basic concepts at the undergraduate level in microorganism biology, molecular and cell biology is required to successfully follow this course.
4.2 learning outcomes	This course is intended for students with background in microbiology who whish to acquire essential knowledge in microbial ecology in order to enhance their expertise in the environmental field

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).

	Some learning activities and coursework may involve frequent use of digital tools and computer-based resources.

6. Overall objective of the course

The course aims to provide students with a foundational understanding of the key concepts in microbial ecology, focusing on the roles and dynamics of microbial communities in natural environments such as water, soil, and sediments.

7. Learning outcomes

Knowledge	The student / graduate will be able to: - Understand the microbial foundations relevant to environmental systems and contaminated sites - Understand the objectives and the techniques to identify and characterize microorganisms in complex communauty - Understand and apply bioremediation methods in the context of environmental monitoring and assessment - Assess health and environmental risks associated with microorganisms
Skills	The student / graduate will be able to: - Use microbial culture, isolation, and identification techniques. - Apply methods for analyzing microbial diversity. - Interpret experimental data from microbial ecology studies.
Responsibility and autonomy	The student / graduate will be able to: - Use advanced digital tools for data analysis. - Communicate scientific results effectively in written and oral English. - Contribute to a collaborative scientific analysis.

8. Teaching methods

The teaching process will involve participatory lectures and discussions, supported by PowerPoint presentations made available to students if necessary. These presentations include images and diagrams to make the information easier to understand and assimilate. Each seminar may be accompanied by additional readings provided by the instructor.

The teaching method is also based on activities in the fields to illustrate or develop a piece of knowledge or specific skills (Self-assessment, reports on readings or case studies for exemple). Collaborative activities may be organized to foster peer interaction and teamwork among students.

Autonomy, adherence to instructions, and a positive attitude toward learning will be actively encouraged and developed throughout the course.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Microbial ecology and remediation of contaminated sites (Bioelectrochemistry and Phytoremediation)	*Interactive lecture* *Guided discussions* *Clarifying explanations* *Conference of experts in the field*	4 hours
9.1.2. Microbial basis		1 hours
9.1.3. Microbial ecology and strategies for detecting and identifying microorganisms (microscopy, -omics)		2 hours
9.1.4. Microbial Ecology and Its Applications (e.g., biofuel, fermentation, environmental focus on biodegradation-bioremediation)		2 hours
9.1.5. The Nitrogen cycle and its environmental impacts		3 hours

9.1.6 Evaluation of the microbial risk assessment in the environment		3 hours
Course bibliography: Relevant scientific literature will be used to support the presentation and understanding of the key concepts introduced in the course		
9.2a Seminar	Working methods [16]	Observations, Time allocation
Critical analysis of scientific articles and ecological datasets related to microbial ecology will be carried out to reinforce understanding of the key themes discussed during lectures	Students will work individually or in groups to address, discuss, and report on experimental designs, scientific studies, or datasets.	14 hours
Bibliography for applied activities (seminar / laboratory / project): Relevant scientific literature will be used to support the presentation and understanding of the key concepts introduced in the course. All sources, documents, and references used during the course sessions (including articles, book excerpts, presentation slides, videos, etc.) will be made available to students. This includes both required readings and supplementary resources intended to deepen understanding of the topics covered in class. Students are encouraged to consult these materials regularly to support their learning and active participation.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade *(recommended to be proportional to the number of hours allocated to each type of activity)*
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Summative assessment test (final evaluation).*	70%
10.5a Seminar	*Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity*	*Active participation in activities; Assessment test.*	30%
10.6 Conditions for passing			
The final grade corresponds to the weighted average of all results obtained from exams and assessed activities completed by the student. Grades are expressed on a scale from 0 to 20. A score of 10/20 indicates that the student has acquired the minimum required knowledge and skills, and is sufficient to validate the ECTS credits.			

Date:

Course instructors: Yannick Colin, Marion Gueganton, Thierry Berthe

Course instructors for applied activities: Yannick Colin, Marion Gueganton, Thierry Berthe

Date of approval by the department: Head of Department: Anthony Delaune

Date of approval by the Faculty Council: Dean,

Bachelor's / Master's degree.
[2] *For Bachelor's: 1-4; for Master's: 1-2.*
[3] *For Bachelor's: 1-8; for Master's: 1-4..*
[4] *Exam (E), assessment (A) – according to the curriculum.*
[5] *DOB – mandatory course, DOP– optional course, DFA– elective course;*
[6] *Duration equals 14 weeks multiplied by the number of hours listed at point 3.1 (similarly for points 3.5 and 3.6abc).*
[7] *The lines below refer to individual study; total is completed at point 3.7.*
[8] *Between 2 and 6 teaching hours, not included in individual study..*
[9] *Total number of individual study hours (sum of values from previous lines).*
[10] *Total of direct teaching hours (3.4) plus individual study hours (3.7); must equal the number of credits (3.9) multiplied by 27 hours per credit.*
[11] *Prerequisite courses that must be passed previously or their equivalents are indicated.*
[12] *Teaching resources: blackboard, video projector, flipchart, specific teaching materials, etc.*
[13] *Technical equipment: computers, software packages, experimental stands, etc*
[14] *Learning outcomes presented as knowledge, skills, responsibility, and autonomy specific to the course, aligned with level 7 of the National Qualifications Framework (NQF) and adapted to the type of university program. For research master's programs, these include competences necessary for conducting independent scientific research (https://www.aracis.ro/wp-content/uploads/2025/07/Standarde-specifice-masterat.pdf).*
[15] *Titles of chapters and paragraphs.*
[16] *Teaching methods: discussions, debates, presentations and/or paper analyses, exercises and problem solving.*
[17] *Practical demonstrations, exercises, experiments.*
[18] *Case studies, demonstrations, exercises, error analysis, etc.*

COURSE GUIDE – extended form

Academic year 2026 – 2027

1. Program information

1.1 University	*Université de Rouen Normandie (URN)*
1.2 Faculty	
1.3 Department	*UFR Sciences et Techniques – Department of Biology*
1.4 Field	*Microbiology*
1.5 Study level	*Master 2*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Pathogens and anti-infective strategies for biotechnology (sub-courses of UE Anti-infective Strategies - M1 Microbiology Health, Well-being and Industry)**			
2.1.2 Course code					2.1.3. Course category Fundamental/Specialized/Complementary)		S
2.2 Course instructor				Olivier Lesouhaitier, Emmanuelle Dé, Emeline Bouffartigues (Maillot), Sylvie Chevalier (Laurency), Ali Tahrioui, Nathalie Connil, Chervin Hassel, Romy Razakandrainibe.			
2.3 Course instructors for applied activities (S, L, P, Pr)				n/a			
2.4 Year of study [2]	2	2.5 Semesterl[3]	3	2.6 Evaluation type[4]	E, A	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	1.5	3.2 course	1.5	3.3a sem.		3.3b laboratory		3.3c project		3.3.d. practice		
3.4 Total hours from curriculum[6]	18	3.5 course	16	3.6a sem.		3.6b laboratory		3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Study in library and practical skills development	29
Preparation of seminars / laboratory works / project phases / home works / presentations	29
Evaluation[8]	2
Other activities:	30

3.7 Total hours of individual study [9]	90
3.8 Total hours per semestre[10]	124
3.9 Number of credits	4

4. Prerequisites (optional)

4.1 curriculum[11]	A solid understanding of basic concepts at the undergraduate level in microorganism biology, molecular and cell biology is required to successfully follow this course.
4.2 learning outcomes	This course is designed for students with a background in microbiology who wish to acquire essential knowledge in anti-infective strategies and deepen their understanding of pathogens and the emerging tools developed to fight them.

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).

	Some learning activities and coursework may involve frequent use of digital tools and computer-based resources.

6. Overall objective of the course

This course aims to raise student awareness of the development of innovative anti-infective strategies through a multidisciplinary approach. The following topics will be covered: Anti-biofilm and anti-persister strategies - Methods for identifying new molecular targets and bioactive compounds - Experimental approaches to studying anti-virulence and anti-biofilm agents- Biotechnological developments based on the therapeutic potential of bacteriocins - Strategies for antiviral vaccination-Therapeutic approaches targeting mesoparasites. By the end of the course, students will be able to critically evaluate emerging anti-infective strategies and contribute to the discovery of new therapeutic agents.

7. Learning outcomes

Knowledge	The student / graduate will be able to: - Understand the principles and mechanisms of anti-biofilm and anti-persister strategies - Understand methods to identify and evaluate new molecular targets and bioactive compounds - Analyze and interpret experimental designs and datasets related to anti-virulence, anti-biofilm, and bacteriocin-based biotechnological developments. - Show understanding with strategies for antiviral vaccination and therapeutic approaches for mesoparasitic infections, including current challenges and innovations.
Skills	The student / graduate: - Apply appropriate methods to measure the antimicrobial activity of bioactive molecules. - Critically engage with **scientific literature** to support the understanding of new therapeutic development. - Interpret experimental data from antibacterial resistance and anti-infective studies.
Responsibility and autonomy	The student / graduate: - Use advanced digital tools for data analysis. - Communicate scientific results effectively in written and oral English. - Contribute to a collaborative scientific analysis. - Demonstrated ability to perform bibliographic monitoring and literature reviews on bacterial resistance and anti-infective therapies.

8. Teaching methods

The teaching process will involve participatory lectures and discussions, supported by PowerPoint presentations made available to students if necessary. These presentations include images, text and diagrams to make the information easier to understand and assimilate. Each course/seminar may be accompanied by additional readings provided by the instructor.

The teaching method is also based on activities in the fields to illustrate or develop a piece of knowledge or specific skills (Self-assessments and reports on readings or case studies). Collaborative activities may be organized to foster peer interaction and teamwork among students.

Autonomy, adherence to instructions, and a positive attitude toward learning will be actively encouraged and developed throughout the course.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Anti-biofilm strategies: New anti-biofilm tools	*Interactive lecture* *Guided discussions* *Clarifying explanations* *Conference of experts in the field*	2 hours
9.1.2. Anti-persister strategies		2 hours
9.1.3. Research of new target and bioactives molecules: Identification of new effectors and molecular targets		1 hour
9.1.4. Research of new target and bioactives molecules: Experimental approaches to anti-virulence and anti-biofilm identification		2 hours
9.1.5. Research of new target and bioactives molecules: Traditional medicine to the discovery of bioactive compounds		1 hour

9.1.6. Biotechnological development: Bacteriocin		2 hours
9.1.7. Strategies for antiviral vaccination		4 hours
9.1.8. Therapeutic strategies for mesoparasites		4 hours
Course bibliography: Scientific literature relevant to the topics covered—such as anti-biofilm strategies, anti-persister approaches, discovery of bioactive compounds or targets, biotechnological developments, and therapeutic strategies—will be used to support the understanding and critical analysis of key concepts presented in course. All sources, documents, and references used during the course sessions (including articles, book excerpts, presentation slides, videos, etc.) will be made available to students through the designated platform. This includes both required readings and supplementary resources intended to deepen understanding of the topics covered in class. Students are encouraged to consult these materials regularly to support their learning and active participation.		
9.2a Seminar Critical analysis of scientific articles and experimental datasets related to anti-infective strategies and pathogens will be carried out to reinforce understanding of the key themes discussed during lectures	Students will work individually or in groups to address, discuss, and report on experimental designs, scientific studies, or datasets.	14
Bibliography for applied activities (seminar / laboratory / project): Scientific literature relevant to the topics covered—such as anti-biofilm strategies, anti-persister approaches, discovery of bioactive compounds, biotechnological developments, and therapeutic strategies—will be used to support the understanding and critical analysis of key concepts presented in course. Activity derived from experimental data examples		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade *(recommended to be proportional to the number of hours allocated to each type of activity)*
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Summative assessment test (final evaluation).*	70 %
10.5a Seminar	*Ability to apply learned knowledge in practice. Ability for analysis, personal interpretation, originality, and creativity*	*Active participation in activities;* *Assessment test.*	30 %
10.6 Conditions for passing			
The final grade corresponds to the weighted average of all results obtained from exams and assessed activities completed by the student. Grades are expressed on a scale from 0 to 20. A score of 10/20 indicates that the student has acquired the minimum required knowledge and skills, and is sufficient to validate the ECTS credits.			

Date:

Course instructor: Olivier Lesouhaitier, Emmanuelle Dé, Emeline Bouffartigues (Maillot), Sylvie Chevalier (Laurency), Ali Tahrioui, Nathalie Connil, Chervin Hassel, Romy Razakandrainibe.

Course instructors for applied activities: Olivier Lesouhaitier, Emmanuelle Dé, Emeline Bouffartigues (Maillot), Sylvie Chevalier (Laurency), Ali Tahrioui, Nathalie Connil, Chervin Hassel, Romy Razakandrainibe.

Date of approval by the department: Head of Department: Anthony Delaune

Date of approval by the Faculty Council: Dean,

COURSE GUIDE – extended form

Academic year 2026 – 2027

1. Program information

1.1 University	*Université de Rouen Normandie (URN)*
1.2 Faculty	
1.3 Department	*UFR Sciences et Techniques – Department of Biology*
1.4 Field	*Microbiology*
1.5 Study level	*Master 2*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Technology, innovation and Industrial Microbiology (sub-courses of UE Technology and Innovation in Microbiology and UE Industrial Microbiology and Biotechnology 1/2, Master of Microbiology Health, Well-being and Industry)**			
2.1.2 Course code		2.1.3. Course category Fundamental/Specialized/Complementary)					
2.2 Course instructor		P. Thebault, C. Duclairoir Poc, E. Bouffartigues (Maillot), O. Lesouhaitier, J. Hardouin, C. Barbey, R. Ismail, J. Vieillard					
2.3 Course instructors for applied activities (S, L, P, Pr)		n/a					
2.4 Year of study [2]		2.5 Semesterl[3]		2.6 Evaluation type[4]		2.7 Course type [5]	

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	1.5	3.2 course		3.3a sem.		3.3b laboratory		3.3c project		3.3.d. practice	
3.4 Total hours from curriculum[6]	21	3.5 course		3.6a sem.		3.6b laboratory		3.6c project			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	50
Study in library and practical skills development	45
Preparation of seminars / laboratory works / project phases / home works / presentations	0
Evaluation[8]	4
Other activities:	

3.7 Total hours of individual study [9]	99
3.8 Total hours per semestre[10]	110
3.9 Number of credits	4

4. Prerequisites (optional)

4.1 curriculum[11]	A solid understanding of basic concepts at the undergraduate level in microorganism biology, molecular and cell biology is required to successfully follow this course.
4.2 learning outcomes	Introduce students to technological, analytical, and regulatory approaches relevant to industrial microbiology in areas of interest, with a focus on innovations and modern tools (interactomics, proteomics, microscopy, biosensors) and quality standards.

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).

	Some learning activities and coursework may involve frequent use of digital tools and computer-based resources.

6. Overall objective of the course

Through a combination of theoretical courses selected from the Master's program in Microbiology, Health, Well-being and Industry at URN, students will explore technological approaches based on -omics and advanced analytical instruments to monitor and control the microbiological quality of various products.

Special attention will be given to regulatory frameworks such as Good Manufacturing Practices, as well as to the evaluation of microbiological safety in areas of interest such as pharmaceuticals, cosmetics, and biotechnology.

7. Learning outcomes

Knowledge	The student / graduate: By the end of the course, students are expected to demonstrate a solid understanding of key methods and technologies used in industrial microbiology and pharmaceutical processes
Skills	The student / graduate: - Understand and apply innovative approaches in microbiology - Interpret omics data - Understand and apply microscopy techniques - Understand fermentation processes - Assess microbiological quality and evaluate alternative decontamination methods
Responsibility and autonomy	The student / graduate: - Use advanced digital tools for data analysis. - Communicate scientific results effectively in written and oral English. - Contribute to a collaborative scientific analysis. - Demonstrated ability to perform bibliographic monitoring and literature reviews on bacterial resistance and anti-infective therapies.

8. Teaching methods

The teaching process will involve participatory lectures and discussions, supported by PowerPoint presentations made available to students if necessary. These presentations include images, texte and diagrams to make the information easier to understand and assimilate. Each course/seminar may be accompanied by additional readings provided by the instructor.

The teaching method is also based on activities in the fields to illustrate or develop a piece of knowledge or specific skills (Self-assessments and reports on readings or case studies). Collaborative activities may be organized to foster peer interaction and teamwork among students.

Autonomy, adherence to instructions, and a positive attitude toward learning will be actively encouraged and developed throughout the course.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Surface Plasmon Resonance (SPR)	*Interactive lecture* *Guided discussions* *Clarifying explanations*	2 hours
9.1.2. Pharmaceuticals industry : process and regulatory compliance (GMPs)		2 hours
9.1.3 Focused on interactomics: exploring genetic, biophysical, and bioinformatic tools		1 hour
9.1.4. Focused on interactomics: Microscale thermophoresis		1 hour
9.1.5 Proteomics/MS Applications in Microbiology and Biotechnology		4 hours
9.1.6 Microscopy-Based Approaches		2 hours

9.1.7 Fermentation Processes in Industrial Microbiology		2 hours
9.1.8 Lab-on-chip and Biosensors		1 hour
9.1.8 Decontamination alternative methods		2 hours
9.1.9 Microbiological quality assessment of cosmetics		2 hours
Course bibliography: Scientific literature relevant to the topics covered—such as anti-biofilm strategies, anti-persister approaches, discovery of bioactive compounds, biotechnological developments, and therapeutic strategies—will be used to support the understanding and critical analysis of key concepts presented in course. Relevant quality guidelines may be applied as needed. All sources, documents, and references used during the course sessions (including articles, book excerpts, presentation slides, videos, etc.) will be made available to students through the designated platform. This includes both required readings and supplementary resources intended to deepen understanding of the topics covered in class. Students are encouraged to consult these materials regularly to support their learning and active participation.		
Bibliography for applied activities (seminar / laboratory / project): This section should include reference titles and materials developed by the course instructor(s), available in printed and/or electronic format — such as problem books, laboratory guides, project manuals, etc.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method	10.3 Percentage of the final grade *(recommended to be proportional to the number of hours allocated to each type of activity)*
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Summative assessment test (final evaluation).*	100%

10.6 Conditions for passing
The final grade corresponds to the weighted average of all results obtained from exams and assessed activities completed by the student. Grades are expressed on a scale from 0 to 20. A score of 10/20 indicates that the student has acquired the minimum required knowledge and skills, and is sufficient to validate the ECTS credits.

Date:

Course instructor: P. Thebault, C. Duclairoir Poc, E. Bouffartigues (Maillot), O. Lesouhaitier, J. Hardouin, C. Barbey, R. Ismail, J. Vieillard

Course instructors for applied activities:

Date of approval by the department: Head of Department: Anthony Delaune

Date of approval by the Faculty Council: Dean,

COURSE GUIDE – extended form

Academic year 2026 – 2027

1. Program information

1.1 University	*Université de Rouen Normandie (URN)*
1.2 Faculty	
1.3 Department	*UFR Sciences et Techniques – Department of Biology*
1.4 Field	
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Engineering project**			
2.1.2 Course code				2.1.3. Course category Fundamental/Specialized/Complementary)			
2.2 Course instructor				Instructors from the Semester 3 program may be invited to participate in this course			
2.3 Course instructors for applied activities (S, L, P, Pr)				n/a			
2.4 Year of study [2]	2	2.5 Semesterl[3]	3	2.6 Evaluation type[4]	A	2.7 Course type [5]	Lab

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	2	3.2 course		3.3a sem.		3.3b laboratory	2	3.3c project		3.3.d. practice
3.4 Total hours from curriculum[6]	30	3.5 course		3.6a sem.		3.6b laboratory	30	3.6c project		

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	30
Study in library and practical skills development	30
Preparation of seminars / laboratory works / project phases / home works / presentations	30
Evaluation[8]	
Other activities:	

3.7 Total hours of individual study [9]	90
3.8 Total hours per semestre[10]	120
3.9 Number of credits	4

4. Prerequisites (optional)

4.1 curriculum[11]	
4.2 learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Host laboratory environment
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector, optimization software (EXCEL, GAMS or similar)

6. Overall objective of the course

The course aims to provide students with a foundational understanding of laboratory based research works in the field of microbiology, cellular biology, biocompatibility and biomaterials

7. Learning outcomes

Knowledge	The student / graduate: *explains the scientific questions he/she wants to answer* *compares various potential approaches* *evaluates the results of his experiments* *defines the design of the needed experiments* *describes the realization of the experiments* *uses all appropriate techniques and materials for its realization* *applies his/her basic knowledge in science and technology*
Skills	The student / graduate: *Learns laboratory skills for the design, realization and read-out of a scientific experiment*
Responsibility and autonomy	The student / graduate: *respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving;* *assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams;* *engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.*

8. Teaching methods

Laboratory immersion

9. Course content

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**	**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.* *Ability to process data and solve given problems.*	*Formative assessment test (ongoing evaluations throughout the semester).*	30%
10.5b Laboratory	*Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts.* *Capacity for analysis, personal interpretation, originality, and creativity.*	*Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work);* *Assessment test (laboratory colloquium).*	50%

10.5c Project	*Participation in the design activity, ability to conduct research, application of knowledge in the design process.*	*Carrying out the design activity; Completion of the project; Project presentation/defense.*	20%

10.6 Conditions for passing
A minimum grade of ECTS' E or up is the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor: All instructors involved in the third semester.

Course instructors for applied activities: All instructors involved in the third semester.

Date of approval by the department: Head of Department: Anthony Delaune

Date of approval by the Faculty Council: Dean,

COURSE GUIDE – extended form

Academic year 2026 – 2027

1. Program information

1.1 University	*Université de Rouen Normandie*
1.2 Faculty	
1.3 Department	*UFR Sciences et technologies*
1.4 Field	*Engineering and Quality for Bioproducts*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Surfaces coating and décontamination**			
2.1.2 Course code					2.1.3. Course category Fundamental/Specialized/Complementary)		
2.2 Course instructor				J Vieillard, G Ladam, P Thébault			
2.3 Course instructors for applied activities (S, L, P, Pr)				n/a			
2.4 Year of study [2]	2	2.5 Semesterl[3]	3	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	1,5	3.2 course	1,5	3.3a sem.		3.3b laboratory		3.3c project		3.3.d. practice		
3.4 Total hours from curriculum[6]	25	3.5 course	25	3.6a sem.		3.6b laboratory		3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	32
Study in library and practical skills development	30
Preparation of seminars / laboratory works / project phases / home works / presentations	30
Evaluation[8]	3
Other activities:	

3.7 Total hours of individual study [9]	95
3.8 Total hours per semestre[10]	120
3.9 Number of credits	4

4. Prerequisites (optional)

4.1 curriculum[11]	Concepts of materials, chemistry, and microbiology
4.2 learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector, optimization software (EXCEL, GAMS or similar)

6. Overall objective of the course

The course aims to provide students with a foundational understanding of the control of the choice of material and the management of material-product and material/living matter interactions

7. Learning outcomes

Knowledge	The students / graduates: Have the knowledge of the issues and the different approaches to develop antibacterial and biomolecule-functionalized surfaces. Introduction to surface characterization methods.
Skills	The students / graduates: Know how to identify problems related to surfaces in bio-industries and be able to propose solutions adapted to the material.
Responsibility and autonomy	The student / graduate: *respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving;* *assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams;* *engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.*

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Surface functionalization 1 (Prof J. Veillard)	*Interactive lecture* *Guided discussions* *Clarifying explanations*	3 hours
9.1.2. Surface functionalization 2 (Prof. G. Ladam)		10 hours
9.1.3. Antimicrobial surfaces (Prof. P. Thébault)		12 hours

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final Exam / Assessment	*Completeness and correctness of knowledge.* *Logical coherence, fluency, strength of argumentation.* *Capacity for analysis, personal interpretation, originality, creativity.* *Degree of mastery of specialized terminology and communication skills.* *Ability to apply acquired skills.*	*Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).*		100%
		Formative assessment test (ongoing evaluations throughout the semester).		

	Ability to process data and solve given problems.	*Summative assessment test (final evaluation).*	*X*	

10.6 Conditions for passing
A minimum grade of ECTS' E or up is the minimal learning outcomes required for the course and the awarding of the corresponding study credits.

Date:

Course instructor:

Course instructors for applied activities:

Date of approval by the department: Head of Department

Date of approval by the Faculty Council: Dean,

COURSE GUIDE – extended form

Academic year 2026 – 2027

1. Program information

1.1 University	*Université de Rouen Normandie*
1.2 Faculty	
1.3 Department	*UFR Sciences et technologies*
1.4 Field	*Biomaterials*
1.5 Study level	*Master*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Material-product compatibility and biological risk**			
2.1.2 Course code					2.1.3. Course category Fundamental/Specialized/Complementary)		
2.2 Course instructor				C Egles, E Gosse, B Labat			
2.3 Course instructors for applied activities (S, L, P, Pr)				n/a			
2.4 Year of study [2]	2	2.5 Semesterl[3]	3	2.6 Evaluation type[4]	E	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	3	3.2 course	3	3.3a sem.		3.3b laboratory		3.3c project		3.3.d. practice		
3.4 Total hours from curriculum[6]	41	3.5 course	41	3.6a sem.		3.6b laboratory		3.6c project				

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	40
Study in library and practical skills development	40
Preparation of seminars / laboratory works / project phases / home works / presentations	40
Evaluation[8]	4
Other activities:	

3.7 Total hours of individual study [9]	124
3.8 Total hours per semestre[10]	170
3.9 Number of credits	6

4. Prerequisites (optional)

4.1 curriculum[11]	Basic concepts of (bio)materials
4.2 learning outcomes	

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector
5.2 Seminar / Laboratory / Project delivery requirements[13]	Blackboard, video projector, optimization software (EXCEL, GAMS or similar)

6. Overall objective of the course

The course aims to provide students with a foundational understanding ofbiomaterials, biomaterials testing and biocompatibility

7. Learning outcomes

Knowledge	- Definitions, properties and applications of nanomaterials in industries - Approach of risks related to nanomaterials (human and environmental) - Definition of Medical Devices (classes, rules, criteria...) - European and international standards for obtaining the CE marking of medical devices - Biological evaluation of biomaterials and medical devices according to ISO 10993 - Regulatory aspect (GHS, CLP and REACh) and impacts of these new regulations within industries, deciphering of labels (pictograms, hazard statements, cautionary advice and mention of warning) and MSDS. - Explanation of the methods of handling and storing chemicals including the notions of incompatibility) - Collective and individual protective equipment - prevention and hygiene measures. - Different routes of penetration are presented as well as the associated impacts. - During tutorial sessions, MSDS are requested, as well as a simulation of a reaction with dangerous and reactive chemicals.
Skills	Skills **Advanced and specialized uses of digital tools** - Identify the digital uses and the impacts of their evolution on the fields concerned by the mention - To use advanced digital tools in an autonomous way for one or several professions or research sectors of the field - Use digital tools in compliance with computer security rules **Development and integration of highly specialized knowledge** - Mobilize highly specialized knowledge, some of which is at the forefront of knowledge in a field of work or study, as a basis for original thinking - Develop a critical awareness of knowledge in a field and/or at the interface of several fields - Conduct a reflective and distanced analysis taking into account the stakes, the problems and the complexity of a request or a situation in order to propose adapted and/or innovative solutions in compliance with the evolutions of the regulation **Support for transformation in a professional context** - Respect the principles of ethics, deontology and environmental responsibility **Scientific and technical mastery** - Identify and apply knowledge and tools related to basic science in health engineering - Provide solutions in terms of continuous improvement of the performance of processes, products and services related to health through the knowledge and understanding of scientific and technical fields - Collect and interpret data using appropriate methods and tools to identify and solve problems **Regulatory and contextual issues** - Appreciate the economic stakes, the respect of the quality, the competitiveness and the productivity, the commercial requirements, the economic intelligence - Conduct a complex project in compliance with quality systems and taking into account the standards and legislation in force - Take into account societal and environmental issues. - Apply national and international regulations
Responsibility and autonomy	The student / graduate: respects ethical principles, standards, and values in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate. Each lecture will begin with a brief review of the topics covered in the previous session.

The teaching method is also based on discovery learning models, facilitated through both direct and indirect exploration of reality (e.g., experiments, demonstrations, modelling). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Techniques and models in the regulatory framework (C. Egles)	*Interactive lecture* *Guided discussions* *Clarifying explanations*	9 hours
9.1.2. Industrial risk - REACH (E. Gosse)		5 hours
9.1.3. Nanomaterials (B. Labat)		10 hours
9.1.4. Medical Devices (B. Labat)		13 hours
9.1.5. Biocompatibility (B. Labat)		4 hours

10. Evaluation

Activity type	**10.1 Evaluation criteria**	**10.2 Evaluation method**		**10.3 Percentage of the final grade** ***(recommended to be proportional to the number of hours allocated to each type of activity)***
10.4 Type of evaluation: Final Exam / Assessment	Completeness and correctness of knowledge. Logical coherence, fluency, strength of argumentation. Capacity for analysis, personal interpretation, originality, creativity. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).	X	100%
		Formative assessment test (ongoing evaluations throughout the semester).		
		Summative assessment test (final evaluation).		
10.6 Conditions for passing				
A minimum grade of ECTS' E or up is the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date:

Course instructor:

Course instructors for applied activities:

Date of approval by the department: Head of Department

Date of approval by the Faculty Council: Dean,

COURSE GUIDE – extended form

Academic year 2026 – 2027

1. Program information

1.1 University	*Université de Rouen Normandie*
1.2 Faculty	*Engineering School for Innovative Technologies (ESITech)*
1.3 Department	*Biological Engineering*
1.4 Field	*Pharmaceutical Technology*
1.5 Study level	*Master of Science in Engineering*
1.6 Specialization	*Chemical and Biochemical Process Technology - CBPT*

2. Course information

2.1.1 Course name				**Biological and Sterile Medicinal Products: industrial context and implementation**			
2.1.2 Course code					2.1.3. Course category Fundamental/Specialized/Complementary)		
2.2 Course instructor				C Duclairoir Poc, A Morin, C Rozé			
2.3 Course instructors for applied activities (S, L, P, Pr)				C Duclairoir Poc, C Rozé, A Chane			
2.4 Year of study [2]	2	2.5 Semesterl[3]	3	2.6 Evaluation type[4]	R/P	2.7 Course type [5]	DOB

3. Amount of time estimated for course activities (hours / term)

3.1 Hours /week	1.5	3.2 course	20	3.3a sem.		3.3b laboratory	20	3.3c project		3.3.d. practice	1
3.4 Total hours from curriculum[6]	40	3.5 course		3.6a sem.		3.6b laboratory		3.6c project			

Time spent for related activities[7]	Hours
Study of recommended books, course support, scientific papers and course notes	5
Study in library and practical skills development	10
Preparation of seminars / laboratory works / project phases / home works / presentations	20
Evaluation[8]	2
Other activities:	3

3.7 Total hours of individual study [9]	40
3.8 Total hours per semestre[10]	80
3.9 Number of credits	4

4. Prerequisites (optional)

4.1 curriculum[11]	A solid understanding of basic concepts at the undergraduate level in biology, physics, chemistry is required to successfully follow this course.
4.2 learning outcomes	Introduce students to technological, formulation, control quality, and regulatory approaches relevant to industrial pharmaceutical technologies in areas of interest, with a focus on production aera and GMPs compliance.

5. Requirements

5.1 Conditions for course delivery[12]	Blackboard, video projector. All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE).
5.2 Seminar / Laboratory / Project delivery requirements[13]	All digital course materials and resources will be provided through the university's virtual learning environment (UniversiTICE). Some learning activities and coursework may involve frequent use of digital tools, virtual reality, computer-based resources, as well the technological pharmaceutical hall with pilot plants used in aseptical or sterile pharmaceutical processes.

6. Overall objective of the course

This course aims to raise students' awareness of the production of biopharmaceuticals in sterile or aseptic processes. In particular, the biotechnological process (USP+DSP) used to obtain recombinant proteins or monoclonal antibodies will be supplemented by the stages of formulation, filling, and even freeze-drying in compliance with drug or biopharmaceutics' Good Manufacturing Practices (GMPs).

By the end of the course, students will be able to manage a biopharmaceutical production process in compliance with various standards, including current Good Manufacturing Practices (cGMPs).

7. Learning outcomes

Knowledge	The student / graduate will be able to: - Understand and master biopharmaceuticals process - Understand how obtain and preserve biopharmaceutical biosafety - Demonstrate knowledge of methods and strategies used for the control and quality assessment of biopharmaceutical products; - Understand the operating principles and applications of pilot bioreactors in biopharmaceutical processes.
Skills	The student / graduate: Implements the right process in regards of the desired biopharmaceuticals forms Manage to control their efficacy and biosafety
Responsibility and autonomy	The student / graduate: respect biopharmaceutical regulations and specifications in the correct and timely completion of professional tasks, by adopting a rigorous, efficient, and responsible work strategy in decision-making and problem-solving; assumes responsibility for contributing to professional knowledge and practices and/or for reviewing the strategic performance of teams; engages in continuous professional development in their field by appropriately using effective lifelong learning methods and techniques.

8. Teaching methods

The teaching process will involve participatory lectures and debates, supported by PowerPoint presentations made available to students. These presentations include images and diagrams to make the information easier to understand and assimilate.

The teaching method is also based on discovery technological practices, facilitated through both direct and indirect exploration of reality (*e.g.,* experiments, demonstrations, virtual reality). Additionally, action-based methods will be employed, such as practical exercises, hands-on activities, and problem-solving tasks.

9. Course content

9. 1. Courses[15]	**Teaching methods**	**Time allocation**
9.1.1. Aseptic production	*Interactive lecture*	4 hours
9.1.2. Biological medicinal production 1 : USP		2 hours

9.1.3. Biological medicinal production 2 : DSP.	*Guided discussions* *Clarifying explanations*	4 hours
9.1.4. Additional manufacturing operation : freeze-drying		2 hours
9.1.5. Manufacturing constaints 1 : clean room		4 hours
9.1.6. Manufacturing constaints 2 : water management		2 hours
9.1.7. Specific Good Manufacturing Practices & focus on qualification/validation		2 hours
Course bibliography: All sources, documents, and references used during the course sessions (including articles, book excerpts, presentation slides, videos, etc.) will be made available to students through the designated platform. This includes both required readings and supplementary resources intended to deepen understanding of the topics covered in class. Students are encouraged to consult these materials regularly to support their learning and active participation.		
9.2b Laboratory	Working methods [17]	
9.2.b.1 Serious game : virtual bioreactor management		4 hours
9.2.b.2 Implementation of sterile medicinal process : Biocleaning, Manufacturing, global quality control (product and environment)		16 hours
Bibliography for applied activities (seminar / laboratory / project): All sources, documents, and references used during the course sessions (including articles, book excerpts, presentation slides, videos, etc.) will be made available to students through the designated platform. This includes both required readings and supplementary resources intended to deepen understanding of the topics covered in class. Students are encouraged to consult these materials regularly to support their learning and active participation.		

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation method		10.3 Percentage of the final grade *(recommended to be proportional to the number of hours allocated to each type of activity)*
10.4 Type of evaluation: Final Exam / Assessment	Completeness and correctness of knowledge. Logical coherence, fluency, strength of argumentation. Capacity for analysis, personal interpretation, originality, creativity. Degree of mastery of specialized terminology and communication skills. Ability to apply acquired skills. Ability to process data and solve given problems.	Systematic observation of students (individual/team assignments – assignments must be completed during the week between lectures, preparation of a report – case study).	X	40%
		Formative assessment test (ongoing evaluations throughout the semester).		
		Summative assessment test (final evaluation).		
10.5b Laboratory	Laboratory activity – Ability to work in a team, ability to apply learned knowledge in practice, in different contexts. Capacity for analysis, personal interpretation, originality, and creativity.	Completion of laboratory sheets (all lab works must be completed, allowing the makeup of only one missed lab work); Assessment test (laboratory colloquium).		60%
10.6 Conditions for passing				
The final evaluation result for a course is determined by considering the scores and weights assigned to each activity within the course. Whole-number grades from 10 to 1 will be awarded, with a grade of 5 certifying the achievement of the minimal learning outcomes required for the course and the awarding of the corresponding study credits.				

Date:

Course instructor: C Duclairoir Poc, A Morin, C Rozé

Course instructors for applied activities: C Duclairoir Poc, C Rozé, A Chane

Date of approval by the department: C Rozé Head of Department

Date of approval by the Faculty Council: Dean,

Annex V: Design process of the Joint Programme

The Joint Master Programme in Chemical and Biochemical Process Technology (CBPT) is developed by Gheorghe Asachi Technical University of Iaşi (TUIASI), in collaboration with the University of Rouen Normandy (URN), and the University of Oviedo (UNIOVI). This interdisciplinary programme is designed for students with backgrounds in chemistry, biotechnology, and related fields, providing them with a comprehensive understanding of modern chemical and biochemical process technologies. The development of the CBPT programme involved multiple rounds of consultations and collaborative discussions among academic representatives from all partner universities, benefitting from the sustained support and strategic feedback of the INGENIUM Alliance Representatives.

A. Timeline and Key Milestones

Phase	Period	Main Activities	Outputs / Deliverables
1. Initial Concept and Initiative	October–December 2024	Initiative launched by TUIASI following discussions within the INGENIUM Alliance on developing joint programmes among partner universities. Preliminary consultations held with interested institutions.	Concept note outlining the rationale for a *Joint Master's Programme in Chemical and Biochemical Process Technology (CBPT)*; identification of core partners (UNIOVI and URN).
2. INGENIUM Joint Programme Call and Consortium Formation	March–April 2025	The INGENIUM Call for the Development of Joint Academic Offers is published. The TUIASI–UNIOVI–URN consortium formally submits a joint proposal for the CBPT programme.	Official submission to INGENIUM; Programme endorsed as an INGENIUM Flagship Programme; establishment of representatives from each university to work on the initiative.
3. Comparative Analysis and Programme Design	April–July 2025	Comparative review of existing English-taught Master's programmes across partner institutions;	Comparative Curriculum Analysis; draft mobility structure

		identification of overlapping competencies and complementary academic strengths.	and credit distribution plan.
4. Curriculum Harmonization and Quality Assurance Review	July–October 2025	Joint working sessions and consultations with institutional quality assurance (QA) offices and the INGENIUM QA Group (WP2) to harmonize modules, credits, and learning outcomes.	Joint Curriculum Framework; QA alignment report based on European Standards and Guidelines (ESG).
5. Governance and Endorsement	November 2025	Presentation and approval by the INGENIUM Alliance Council (IAC). Partners sign a The Interinstitutional Agreement defining responsibilities, credit recognition, and degree structure.	Formal partnership agreement signed.
6. Accreditation and Implementation Preparation	December 2025 - January 2026 (planned)	TUIASI leads the accreditation process with full support from UNIOVI and URN.	Accreditation Dossier prepared for national authorities; joint promotion strategy under the INGENIUM brand.

B. Participating Institutions and Roles

Partner	Main Contributions and Responsibilities
TUIASI – Gheorghe Asachi Technical University of Iași (Lead Institution)	Lead coordinator of the CBPT joint programme. Responsible for the national accreditation process and overall management. Provides academic expertise in Biotechnology and Biochemical Engineering. Liaises with INGENIUM governance bodies and ensures compliance with Romanian accreditation standards.
UNIOVI – University of Oviedo	Provides academic expertise in Chemical Engineering, with emphasis on sustainable process design and industrial

	applications. Supports quality assurance alignment, European standardization, and harmonization of learning outcomes. UNIOVI is the Ingenium Aliance coordinator.
URN – University of Rouen Normandy	Brings complementary expertise in Biology and Microbiology, enriching the interdisciplinary profile of the programme. Leads the design of bioprocess and biotechnology-related modules; assists with student mobility coordination.
Other INGENIUM Alliance Universities	Although not direct degree-awarding partners, other INGENIUM institutions will promote the CBPT programme within the Alliance as part of the shared European academic offer, enhancing visibility and student recruitment.

C. Governance and Working Structures

- Joint Academic Committee (JAC):
  The central governance body of the CBPT Joint Programme, composed of academic coordinators and representatives from TUIASI, UNIOVI, and URN. Responsible for:
  - Overseeing academic coherence and programme implementation.
  - Approving curriculum revisions, teaching assignments, and quality assurance actions.
  - Monitoring student progression and credit recognition.
  - Reporting to the INGENIUM Alliance Council (IAC) on programme outcomes and developments.

D. Alignment with INGENIUM Strategic Objectives

Strategic Objective	Programme Contribution
Promote European joint education pathways	Multi-campus structure integrating academic resources from Romania, Spain, and France.
Support interdisciplinarity and innovation	Combines biotechnology, biochemical engineering, chemical engineering, and microbiology to address industrial and environmental challenges.
Foster flexible and inclusive learning	Enables joint supervision, blended delivery, and recognition of credits across the INGENIUM network.

Enhance European identity in higher education	Developed and promoted under the INGENIUM Alliance; designated as an INGENIUM Flagship Programme, symbolizing European cooperation and shared academic standards.

GDPR DATA PROCESSING AGREEMENT

CBPT Joint Master Programme

Parties:

- Universitatea Tehnică ”Gheorghe Asachi” din Iași (TUIASI), Romania
- Universidad de Oviedo (UNIOVI), Spain
- Université de Rouen Normandie (URN), France

Effective Date: [To be determined upon programme launch]

Programme: Chemical and Biochemical Process Technology (CBPT) Joint Master Programme

1. SUBJECT MATTER AND SCOPE

1.1 Purpose

This Data Processing Agreement (DPA) establishes the conditions for lawful processing of personal data of students, staff, and other data subjects in the context of the CBPT Joint Master Programme, in compliance with:

- Regulation (EU) 2016/679 (General Data Protection Regulation - GDPR)
- Romanian Law 679/2001 (Data Protection in Romania)
- Spanish Organic Law 3/2018 (LOPDGDD - Spanish Data Protection Law)
- French Data Protection Act and compliance with CNIL (Commission Nationale de l'Informatique et des Libertés)

1.2 Parties' Roles

This Agreement defines the relationship between the three Partner Universities in the processing of personal data, recognizing that:

- Each Partner is a **Data Controller** for its respective processing activities
- Each Partner acts as a **Data Processor** when processing data on behalf of other Partners
- Data subject rights are protected across all three jurisdictions

1.3 Data Scope

This agreement covers personal data of:

- **Student data:** All 30 students per cohort across all four semesters
- **Staff data:** Teaching and administrative personnel involved in programme delivery

- **Institutional data:** Records necessary for programme administration
- **Research data:** If applicable to thesis supervision and research activities

2. STUDENT MOBILITY FLOW AND DATA PROCESSING
2.1 Mobility Timeline and Data Processing Points
Semester 1 (TUIASI - Romania)

- **Location:** TUIASI campus, Iași, Romania
- **Data Controller:** TUIASI
- **Data Processor:** None (TUIASI controls own data)
- **Processing Activities:**
  - Student enrollment and registration (RMUR/RUNIDAS system)
  - Academic records and assessment results
  - Student health and welfare records
  - Accommodation and visa documentation
- **Legal Basis:** Contract performance (Article 6(1)(b) GDPR); Legal obligation (Article 6(1)(c) GDPR)
- **Data Recipients:** TUIASI administrative staff, teaching faculty
- **Retention:** Duration of studies + 5 years (per Romanian regulations)

Semester 2 (UNIOVI - Spain)

- **Location:** UNIOVI campus, Oviedo, Spain
- **Data Controller:** UNIOVI
- **Data Processor:** TUIASI (regarding student information from Semester 1)
- **Processing Activities:**
  - UNIOVI student enrollment and RUCT registration
  - Academic records and assessment results
  - Spanish academic transcript generation
  - Student accommodation and health support
  - Erasmus grant administration by UNIOVI
- **Legal Basis:** Contract performance; Legal obligation
- **Data Recipients:** UNIOVI administrative staff, teaching faculty, Spanish Ministry of Universities
- **Data Transfer from TUIASI to UNIOVI:**
  - Student application materials and grades (necessary for program continuation)

    - Personal identification data
    - Health and accommodation information
    - Data transferred via secure email or encrypted portal
    - Processing Agreement (below) governs transfer
- **Retention:** Per Spanish regulations (typically 5 years post-graduation)

Semester 3 (URN - France)

- **Location:** URN campus, Rouen, France
- **Data Controller:** URN
- **Data Processor:** UNIOVI (regarding data from Semester 2)
- **Processing Activities:**
    - URN student registration
    - French academic records and assessment results
    - Student accommodation and social security coordination
    - French research ethics oversight (if applicable)
    - Ministry of Higher Education notification
- **Legal Basis:** Contract performance; Legal obligation
- **Data Recipients:** URN administrative staff, teaching faculty, French Ministry of Higher Education, CNIL
- **Data Transfer from UNIOVI to URN:**
    - Student academic records and performance
    - Personal identification and contact information
    - Health and emergency contact information
    - Erasmus grant information
    - Secure transfer via encrypted channels
- **Retention:** Per French regulations (typically during studies + 3 years)

Semester 4 (Distributed - All Partners)

- **Location:** Distributed among partners based on thesis supervisor assignment
- **Data Controller:** Host institution (where student is assigned for thesis)
- **Data Processors:** Other two partners (for prior academic records)
- **Processing Activities:**
    - Thesis supervision records
    - Research data management
    - Final assessment and grading

    - Dissertation submission and archiving
    - Degree certification and diploma issuance
- **Legal Basis:** Contract performance; Legal obligation
- **Data Recipients:** All three partner universities' administrative and academic staff
- **Data Transfer:**
    - All academic records from previous semesters compiled by TUIASI
    - Shared with thesis host institution for final assessment
    - Thesis materials may be archived by all three partners (for institutional records)
- **Retention:** Permanent (thesis retention per academic standards) + 5 years administrative records

3. DATA SHARING BETWEEN PARTNERS

3.1 Necessary Data Sharing

Data Shared from TUIASI to UNIOVI (Semester 1→2):

- Full name, date of birth, nationality
- Student ID number and enrollment status
- Contact information (email, phone, address)
- Academic transcript and grades
- Course completion certificates
- Health information (relevant to mobility/accommodation)
- Emergency contact information

Data Shared from UNIOVI to URN (Semester 2→3):

- All student identification data
- Complete academic record from Semesters 1-2
- Assessment results and grading information
- Attendance records
- Any disciplinary records (if applicable)
- Health and accommodation information
- Erasmus grant status

Data Shared from URN to TUIASI (Semester 3→4):

- Complete academic record for all three semesters
- Thesis supervisor assignment information
- Research ethics clearance (if applicable)
- Student performance and attendance

- Any disciplinary or conduct issues

3.2 Data Transfer Mechanisms

Secure Transfer Protocol:

- Encrypted email with password protection
- Secure file transfer protocol (SFTP) or virtual data room
- No personal data in email subject lines
- Confirmation of receipt and secure deletion

Frequency:

- End of Semester 1: Data package transferred from TUIASI to UNIOVI (2 weeks before Semester 2 start)
- End of Semester 2: Data package transferred from UNIOVI to URN (2 weeks before Semester 3 start)
- End of Semester 3: Comprehensive records transferred to thesis host institution (1 month before Semester 4)

3.3 Data Processing Agreements Between Partners

Separate bilateral Data Processing Agreements shall be concluded between:

1. TUIASI ↔ UNIOVI (governing Semester 1→2 data transfer)
2. UNIOVI ↔ URN (governing Semester 2→3 data transfer)
3. Both TUIASI and UNIOVI ↔ URN (governing data compilation for Semester 3 completion)

Each bilateral agreement shall specify:

- Data Processor obligations and restrictions
- Sub-processor authorization procedures
- Data subject rights procedures
- Audit and inspection rights
- Liability allocation
- Term and termination

4. LEGAL BASIS FOR PROCESSING

4.1 Primary Legal Bases

Article 6(1)(b) GDPR - Contract Performance:

- Processing necessary to perform the contract for student admission and enrollment
- Processing necessary for teaching delivery and assessment
- Processing necessary for mobility coordination

Article 6(1)(c) GDPR - Legal Obligation:

- Romanian Law 1/2023 requires student enrollment records in RMUR/RUNIDAS
- Spanish RD 822/2021 requires RUCT registration and academic records
- French Code de l'Éducation requires institutional record-keeping
- Financial obligations (fee collection, Erasmus management)

Article 6(1)(f) GDPR - Legitimate Interests:

- Student welfare and safety during international mobility
- Quality assurance and program evaluation
- Fraud prevention and misconduct investigation

4.2 Special Category Data

Health Data:

- Processing based on Article 9(2)(h) GDPR (health purposes for medical treatment)
- Student medical information necessary for:
  - Accommodation and accessibility arrangements
  - Emergency medical care during mobility
  - Health insurance coordination
  - Visa requirements

5. DATA SUBJECT RIGHTS

5.1 Right of Access (Article 15 GDPR)

Students may request access to their personal data held by any Partner:

- Request must be submitted to the Partner holding the data
- Response within 30 calendar days (or 60 days if complex)
- If data held by another Partner, originating request forwarded for compliance
- No charge for reasonable access requests

5.2 Right to Rectification (Article 16 GDPR)

Students may request correction of inaccurate data:

- Request submitted to Partner holding the data
- Correction made within 30 days
- Other Partners notified of corrections (particularly important for academic records)
- Corrected information shared in future data transfers

5.3 Right to Erasure (Article 17 GDPR)

Students may request deletion of personal data:

- Limited by educational record retention requirements
- Generally NOT applicable during active enrollment and 5-year post-graduation retention period
- Exception: Erasure of marketing/non-essential data
- Procedure: Request to Partner, consultation with other Partners regarding shared data

5.4 Right to Data Portability (Article 20 GDPR)

Students may request their data in structured format:

- Including academic records, grades, transcripts
- Provided by Partner in common electronic format (CSV, PDF)
- May be requested at end of each semester or upon program completion
- No charge for reasonable requests

5.5 Right to Object (Article 21 GDPR)

Students may object to:

- Processing for legitimate interests (e.g., quality assurance surveys)
- Marketing communications
- Profiling for evaluation purposes

Objection procedures:

- Submit to any Partner; forwarded to relevant Controller
- Response within 30 days

5.6 Exercise of Rights Across Borders

Critical Provision for Student Mobility:

- Student may exercise rights with ANY Partner (regardless of where data is held)
- Partner receiving request shall:

- Respond if data controller for requested data
- Forward to relevant Partner if data processor or data held by another Partner
- Provide timeline for response
- Copy requesting student on all inter-partner communications

6. INFORMATION AND TRANSPARENCY

6.1 Privacy Notices

Each Partner shall provide written privacy notice to students:

- **At Enrollment:** TUIASI provides comprehensive privacy notice (Semester 1 enrollment)
- **Before Mobility:** UNIOVI provides supplementary privacy notice (before Semester 2)
- **Before Mobility:** URN provides supplementary privacy notice (before Semester 3)
- **Before Thesis:** Thesis host institution provides research-specific notice (before Semester 4)

Content of Privacy Notices:

- Data controller identity and contact information
- Purposes of processing
- Legal basis for processing
- Recipients of data
- Retention periods
- Data subject rights and how to exercise them
- Right to lodge complaint with DPA
- Information about automated decision-making (if applicable)

6.2 Data Retention Information

Student Data Retention Schedule:

Type of Data	Retention Period	Justification
Student identification data	Duration of studies + 5 years	Legal obligation (all three countries)
Academic records and grades	Duration of studies + 5 years	Legal obligation; diploma verification
Assessment results	Duration of studies + 5 years	Quality assurance and appeals
Attendance records	During studies	Quality assurance only
Health/accommodation data	During studies + 1 year	Risk management and insurance
Thesis/dissertation	Permanent	Institutional archives and copyright
Disciplinary records	During studies + 2 years	Misconduct prevention

Type of Data	Retention Period	Justification
Marketing/survey data	1 year	Consent-based; can be deleted on request

7. SECURITY AND PROTECTION MEASURES

7.1 Technical Safeguards

Each Partner shall implement:

- **Encryption:** All personal data in transit and at rest using industry-standard encryption (AES-256 or equivalent)
- **Access Controls:** Role-based access to student data systems (limited to authorized staff)
- **Network Security:** Firewalls, intrusion detection systems, regular security updates
- **Audit Logging:** Records of all data access and processing activities
- **Incident Response:** Procedures for breach identification and remediation

7.2 Organizational Safeguards

- **Data Protection Training:** Annual GDPR and data protection training for all staff accessing student data
- **Data Protection Policies:** Each Partner maintains written data protection policies
- **Designated Personnel:** GDPR Data Protection Officer or equivalent contact at each Partner
- **Documentation:** Records of processing activities (per Article 30 GDPR)

7.3 Incident Management

Breach Notification Procedure:

- If personal data breach detected at any Partner:
  - Partner immediately notifies other two Partners
  - Notification within 24 hours via phone/secure email
  - Assessment of breach severity and scope
  - Student notification within 72 hours (if high risk)
  - Notification to relevant Data Protection Authorities:
    - Romania: AEPD (Romanian National Supervisory Authority)
    - Spain: AEPD (Spanish Data Protection Authority)
    - France: CNIL (French National Commission)

8. SUB-PROCESSORS AND THIRD PARTIES

8.1 Sub-Processor Authorization

Each Partner may engage sub-processors for:

- Cloud storage providers (document archiving)
- Email and communication systems
- Learning management systems (Moodle, Blackboard)
- Erasmus administration platforms (EACEA systems)
- Student information systems

Requirements:

- Sub-processors must have in place equivalent data protection measures
- No unauthorized sub-processor engagement
- Written contracts with sub-processors including GDPR clauses
- Notification to other Partners of any new sub-processor engagement

8.2 International Data Transfers

Standard Contractual Clauses (SCCs):

- Data transfers comply with GDPR Chapter V mechanisms
- Personal data may be transferred between Partners in EU (intra-EU transfers generally unrestricted)
- If transfers outside EU occur (future expansion): SCCs or Binding Corporate Rules (BCRs) required

9. DATA PROTECTION IMPACT ASSESSMENT

9.1 DPIA Requirement

Partners acknowledge that processing student data across multiple international jurisdictions constitutes high-risk processing requiring:

- Joint Data Protection Impact Assessment (DPIA)
- Risk analysis and mitigation measures
- Regular review and updates
- Consultation with DPAs if residual risks remain high

9.2 DPIA Scope

The DPIA shall address:

- Large-scale processing of students across three countries
- Systematic monitoring of academic performance and behavior
- Profiling for progression/performance evaluation
- Cross-border data flows and interoperability risks
- Access controls and authorization procedures

10. ACCOUNTABILITY AND AUDIT

10.1 Records of Processing Activities

Each Partner maintains detailed records of processing activities (per Article 30 GDPR):

- Purpose of processing
- Categories of data and recipients
- Data retention periods
- Technical and organizational security measures
- Details of data sharing with other Partners

10.2 Audit and Inspection Rights

- Partners grant each other right to audit compliance with this Agreement
- Audit may occur annually or upon request following security incident
- Audit conducted by Partner's Data Protection Officer or qualified third party
- Audit findings shared with Partners and recommendations implemented
- No advance notice required (except operational audits), but good faith cooperation expected

10.3 Documentation and Evidence

Partners shall maintain evidence of:

- Privacy notice provision
- Data subject consent (if applicable)
- Processing activity records
- Security incident logs
- Audit reports and corrective actions
- Data subject rights requests and responses

11. COOPERATION WITH DATA PROTECTION AUTHORITIES

11.1 DPA Consultation and Cooperation

Partners commit to:

- Responding promptly to DPA requests for information
- Cooperating fully with DPA investigations
- Implementing DPA recommendations and orders
- Notifying all Partners of significant DPA communications

11.2 DPA Contacts

- **Romania:** AEPD (Romanian National Supervisory Authority) - www.dataprotection.ro
- **Spain:** AEPD (Spanish Data Protection Authority) - www.aepd.es
- **France:** CNIL (National Commission) - www.cnil.fr

12. TERM AND TERMINATION

12.1 Term

This DPA commences upon CBPT Programme launch and continues:

- During active programme operation
- During data retention periods as specified in this Agreement
- Until all data has been lawfully deleted or anonymized

12.2 Termination

Upon programme termination or withdrawal of Partner:

- Data continues to be protected under this Agreement during retention periods
- Data transfer/processing procedures established for continuing Partners
- Departing Partner either returns data or certifies deletion
- Retention obligations survive termination

12.3 Amendments

This DPA may be amended:

- By mutual written consent of all three Partners
- To comply with new legal requirements or DPA guidance
- To incorporate new security measures
- Amendments effective upon written confirmation by all Partners

13. LIABILITY AND REDRESS

13.1 Liability Allocation

- Each Partner liable for GDPR violations occurring within its processing
- Joint liability where multiple Partners contribute to violation
- Liability capped at damages directly caused (not indirect or consequential)
- Insurance requirements per main Cooperation Agreement

13.2 Data Subject Rights and Remedies

Data subjects may lodge complaints with:

- Relevant Data Protection Authority
- Civil courts in country of residence
- Partner institution directly for internal remedies

14. DISPUTE RESOLUTION

Disputes regarding data processing shall be resolved through:

1. Consultation between Partners' Data Protection Officers (first level)
2. Escalation to Rectors if not resolved within 30 days
3. Mediation by independent GDPR expert (if still unresolved)
4. Binding arbitration per main Cooperation Agreement (final)

15. SIGNATURE AND EFFECTIVE DATE

On behalf of Gheorghe Asachi Technical University Iasi (TUIASI):

Rector Name: _____ Date: _____

Signature: _____ Title: Rector

Data Protection Officer: _____ Date: _____

On behalf of Universidad de Oviedo (UNIOVI):

Rector Name: _____ Date: _____

Signature: _____ Title: Rector

Data Protection Officer: _____ Date: _____

On behalf of Université de Rouen Normandie (URN):

Rector Name: _____Date: _____

Signature: _____Title: Rector

Data Protection Officer: _____Date: _____

END OF GDPR DATA PROCESSING AGREEMENT

INTELLECTUAL PROPERTY AGREEMENT

CBPT Joint Master Programme

Parties:

- Gheorghe Asachi Technical University Iasi (TUIASI), Romania
- Universidad de Oviedo (UNIOVI), Spain
- Université de Rouen Normandie (URN), France

Effective Date: [To be determined upon programme launch]

Programme: Chemical and Biochemical Process Technology (CBPT) Joint Master Programme

1. DEFINITIONS AND SCOPE

1.1 Definitions

Intellectual Property Rights (IPR):

- Patents, utility models, and invention disclosures
- Copyrights and related rights (including course materials, textbooks, software)
- Trademarks and trade secrets
- Database rights and design rights
- Moral rights of authors
- Know-how and confidential information

Intellectual Output:

- Any creation arising from participation in the CBPT Programme, including:
  - Course materials and curriculum design
  - Teaching methodologies and pedagogical innovations
  - Research publications and conference papers
  - Dissertations and theses
  - Software and digital tools
  - Data compilations and databases
  - Teaching videos and multimedia materials

Background IP:

- Intellectual property owned or controlled by a Partner prior to this Agreement

- Background IP remains fully owned by originating Partner
- Rights to use Background IP specified in this Agreement

Foreground IP:

- Intellectual property created during the CBPT Programme
- Covered by provisions in this Agreement

Creator/Inventor:

- Individual researcher, teacher, or student who authored or created the Intellectual Output

Partner Institution:

- TUIASI, UNIOVI, or URN, as the employing or enrolling institution

1.2 Scope

This Agreement applies to all Intellectual Outputs created:

- By faculty members in their capacity as CBPT teaching staff
- By researchers involved in CBPT-related research activities
- By students enrolled in the CBPT Programme
- Using institutional resources or facilities of any Partner
- That relate to the CBPT Programme subject matter (chemical and biochemical process technology)

2. GUIDING PRINCIPLES

2.1 Creator Retention

CORE PRINCIPLE: Individual researchers, lecturers, and students retain intellectual property rights to their original work created within the CBPT Programme, subject to institutional obligations and this Agreement.

This principle reflects:

- European academic tradition emphasizing creator rights
- Alignment with each Partner Institution's IP policies
- Recognition that individual creativity drives academic excellence
- Balance between creator incentives and institutional mission

2.2 Institutional IP Policies Acknowledged

The three Partners acknowledge and respect each institution's existing IP policies:

TUIASI IP Policy:

- Faculty members and researchers retain rights to their scholarly work
- TUIASI retains ownership of works created using significant institutional resources
- Revenue sharing for commercialized inventions
- Moral rights retained by creators

UNIOVI IP Policy:

- Authors retain copyright to scholarly publications
- Researchers retain rights to inventions with institutional recognition
- Revenue sharing for commercialization
- Creators acknowledged in institutional documentation

URN IP Policy:

- Creators maintain rights to academic publications
- Inventions protected through institutional patent processes
- Revenue sharing arrangements for commercialization
- Moral rights and attribution guaranteed

2.3 Harmonized Framework

This Agreement establishes a harmonized framework that:

- Respects each Partner's institutional policies
- Protects creator rights across all three jurisdictions
- Enables collaborative research and teaching
- Allows commercial exploitation with appropriate revenue sharing
- Maintains academic freedom and attribution

3. OWNERSHIP OF INTELLECTUAL OUTPUTS

3.1 Course Materials and Teaching Content

Ownership Allocation:

Type of Material	Creator	Owner	Rights
Individual lecture notes	Faculty member	Faculty member	Creator retains all rights

Type of Material	Creator	Owner	Rights
Published textbooks	Faculty member	Faculty member	Creator may grant limited license to Partners
Curriculum design	Faculty committee	Faculty members (joint)	Collective ownership; unanimous consent required for changes
Teaching videos	Faculty member	Faculty member	Faculty retains copyright; Partner may license for internal use during program
Online course content	Faculty member	Faculty member	License granted for program delivery
Assessment materials	Faculty member	Faculty member	Creator retains; used under program agreement

Faculty Retention Rights:

- Faculty members retain full copyright to original course materials
- Faculty may use materials in other teaching contexts (with acknowledgment of Partners)
- Faculty may update/revise materials independently
- Faculty may commercially publish materials (with acknowledgment of Partners if appropriate)

Partner Institution License:

- Each Partner obtains automatic license to use faculty-created course materials
- License scope: Delivery of CBPT Programme during active programme operation
- License limitations: Materials cannot be used for competing or similar programmes without creator consent
- License term: Duration of CBPT Programme + 5 years (for archival purposes)
- No sublicense to third parties without creator consent

3.2 Dissertations and Student Research

Student Work Ownership:

Students retain full copyright and intellectual property rights to:

- Master's dissertations and theses
- Research data collected during thesis work
- Publications arising from thesis research
- Software or databases developed during thesis work

Institutional Rights (Students):

- Student grants each Partner institution non-exclusive, royalty-free license to:
  - Preserve thesis in institutional repository
  - Make thesis publicly available (unless confidentiality requested)

- Use thesis for quality assurance and programme evaluation
- Use thesis in teaching (with attribution)

- Licence survives indefinitely
- Student may restrict access for confidentiality (e.g., pending patent filing)

Thesis Supervisor Intellectual Property:

- Supervisor contributions to student research are governed by institutional employment relationship
- Supervisor ownership determined by respective institution's IP policies
- Supervisor retains right to:
  - Co-author publications with student
  - Use research for own scholarly publications
  - Claim inventorship if inventions created

Co-authorship Rights:

- Student-supervisor co-authorship encouraged
- Both parties share copyright in co-authored works
- Both parties have independent right to use/publish
- Attribution to all authors required

3.3 Research Publications

Scholarly Publications from CBPT Research:

Ownership:

- Authors retain copyright to research publications
- Copyright ownership remains with author(s) even after publication
- Publisher obtains limited license for publication and distribution

Authorship and Attribution:

- CBPT Programme acknowledged in publications (author requirement)
- All contributors acknowledged in author list
- Institutional affiliations listed for each author
- INGENIUM Alliance acknowledged (as appropriate)

Open Access Requirement:

- Authors encouraged to publish in open access venues when possible
- Authors retain right to deposit preprints in institutional repositories
- CBPT Programme supports open access publication costs (subject to funding availability)

Collaborative Publications:

- Publications involving authors from multiple Partners
- Joint ownership of copyright (each author owns equal share)
- Any author may use/adapt publication independently (provided attribution to co-authors)
- Revenue from publication shared among authors per their contribution

3.4 Software and Digital Tools

Software Created by Faculty:

Development Context	Creator	Owner	Rights
Faculty research project	Faculty member	Faculty member	Full IP rights retained
Classroom teaching tool	Faculty member	Faculty member	Non-exclusive license to Partners for program delivery
Funded research project	Faculty member (employing institution often owns)	Depends on funding agreement	Creator ownership respected where possible
Student project/software	Student	Student	Full ownership; license to Partners for evaluation and archival

Software License to Partners:

- Creator grants Partners non-exclusive, royalty-free license
- License scope: Use within CBPT Programme for teaching and research
- No right to sublicense or commercialize without creator consent
- License survives programme termination for archival purposes
- Creator retains right to improve/commercialize independently

Open Source Software:

- Software developed under CBPT may be released under open source licenses (creator choice)
- Partners support open source initiatives (e.g., GitHub repositories)
- Compliance with open source license terms required by all Partners

3.5 Data and Databases

Research Data Created During CBPT:

- Student and faculty retain primary ownership of research datasets
- Research data made available to Partners for:
  - Quality assurance purposes

- Institutional repository archival
- Further research (with creator permission)

- Data access restrictions respected (e.g., confidential or commercially sensitive data)
- Data management plan developed for each research project

Database Rights:

- Creator retains database rights where applicable
- Other researchers may access database for non-commercial research
- Commercial use of database requires creator consent and potential licensing arrangement

4. ATTRIBUTION AND ACKNOWLEDGMENT REQUIREMENTS

4.1 Attribution in Academic Work

All Intellectual Outputs must include clear attribution:

In Published Works:

- Author and creator names clearly listed
- Institutional affiliations documented
- CBPT Programme acknowledged (e.g., "This research was conducted as part of the CBPT Joint Master Programme")
- Partners acknowledged where applicable
- Funding sources acknowledged

In Teaching Materials:

- Creator name and institution listed
- Date of creation/last update included
- Other contributors/sources acknowledged

In Dissertations:

- Students acknowledge supervisors and institutions
- CBPT Programme identified in thesis
- Funding sources listed

4.2 INGENIUM Alliance Acknowledgment

Where applicable, Intellectual Outputs acknowledge:

- "This work was conducted within the CBPT Joint Master Programme"
- "CBPT is implemented by [TUIASI], [UNIOVI], and [URN]"
- "CBPT is part of the INGENIUM European University Alliance"

- Funding from Erasmus+ (where applicable)

4.3 Institutional Repository Inclusion

Partners maintain institutional repositories where Intellectual Outputs are preserved:

- TUIASI Digital Repository
- UNIOVI Thesis and Research Repository
- URN Documentation Server

Creators grant Partners license to include works in repositories:

- Works remain openly accessible (unless confidentiality restrictions apply)
- Repositories preserve long-term access
- Metadata includes full attribution and acknowledgment

5. COMMERCIAL EXPLOITATION AND REVENUE SHARING

5.1 Commercialization Eligibility

Intellectual Outputs eligible for commercialization include:

- Software tools with market potential
- Process innovations or improvements
- Patents or patentable inventions
- Specialized teaching methodologies
- Databases or data analytics tools

5.2 Revenue Sharing for Commercialized IP

Ownership and Profit Sharing:

When Intellectual Output is commercialized:

Scenario	Creator Share	Employer Institution Share	Partner Institutions Share
Individual faculty invention	30-40%	40-50%	10-20% (acknowledgment)
Multi-author publication (licensing)	50-70% (combined)	20-30%	10-20% (acknowledgment)
Software with Partners involved	40-50%	40-50%	Negotiated per contribution
Research funded externally	Per funding agreement	Per employment contract	Negotiated

Revenue Distribution Process:

- Creator's institution collects licensing revenue
- Revenue distributed per above percentages
- Creator receives share before institutional deductions
- Quarterly accounting to Creator
- Annual accounting to all Partners

5.3 Patent Protection

Patent Inventions:

- Creator notifies employing institution of potential patentable invention
- Institution evaluates patentability and commercial potential
- If pursued: Institution files patent (typically in creator's name)
- Patent prosecution costs borne by institution
- Creator receives share of revenue from:
  - Licensing fees
  - Sales of licensed products
  - Technology transfer transactions

Inter-Partner Patent Protection:

- If invention involves researchers from multiple Partners:
  - Lead institution (where majority of work occurred) files patent
  - Other Partners may join as co-applicants (if significant contribution)
  - Revenue shared among Partner institutions per agreement

5.4 Confidentiality and Trade Secrets

Before Patent Filing:

- Creators maintain confidentiality of invention during patent evaluation period (typically 3-6 months)
- Confidentiality extends to other Partners
- Publication delayed until patent application filed

Trade Secrets:

- If invention protected as trade secret rather than patent:
  - Creator and employing institution control dissemination
  - Other Partners respect confidentiality
  - Commercial terms negotiated

6. COLLABORATIVE AND JOINT IP

6.1 Multi-Partner Intellectual Outputs

When Faculty/Students from Multiple Partners Collaborate:

Joint Authorship:

- All contributors listed as joint authors/creators
- Each Partner acknowledges contribution of own staff/students
- Joint ownership of copyright (each author owns equal share, unless agreed otherwise)

Revenue Sharing from Joint IP:

- Revenue shared among Partner institutions proportional to contribution
- Creator(s) receive primary share per Section 5.2
- Remaining institutional share divided among involved Partners

Decision-Making for Joint IP:

- Key decisions (publication, licensing, commercialization) require:
  - Consent of creator(s)
  - Consultation with each involved Partner
  - Effort to reach consensus
  - If no consensus: Majority vote of involved Partners

6.2 Example: Multi-Author Publication

Scenario: Publication co-authored by faculty from TUIASI, UNIOVI, and URN

Copyright Ownership:

- Each author retains ownership share (typically 1/3 each)
- Each Partner institution acknowledges contribution

Publication Revenue (if applicable):

- Publisher fee or licensing revenue
- Creator share: 50% (distributed equally among co-authors)
- Partner institutions: 50% divided equally among three Partners (since contribution equal)

7. BACKGROUND INTELLECTUAL PROPERTY

7.1 Background IP Identification

Each Partner may use Background IP (pre-existing IP) within the CBPT Programme:

- TUIASI's Bioprocessing Laboratory techniques
- UNIOVI's Process Optimization methodologies
- URN's Environmental Analysis Tools

7.2 Background IP License

Automatic License:

- Partners grant each other non-exclusive, royalty-free license to use Background IP
- License scope: Limited to CBPT Programme delivery
- No right to commercialize Background IP without originating Partner consent
- No sublicense to third parties

License Restrictions:

- Background IP may not be used for competing programmes
- Background IP may not be modified without originating Partner consent
- Originating Partner retains all ownership rights
- License term: Duration of CBPT Programme

7.3 Foreground IP from Background IP

Derivative Works:

If faculty/student creates Foreground IP based on or building upon Background IP:

- Creator retains ownership of Foreground IP
- Foreground IP may be used/commercialized independently
- Originating Partner of Background IP may:
  - Request acknowledgment in derivative works
  - Request royalty share if Background IP substantially contributed
  - Negotiate commercial terms if derivative highly valuable

8. THIRD-PARTY INTELLECTUAL PROPERTY

8.1 Use of Third-Party Materials

In Teaching Materials:

- Faculty ensure all third-party works properly licensed
- Copyright holders credited appropriately
- Fair use/fair dealing considered where applicable
- Licensing fees paid by employing institution (where required)

In Research:

- Proper citations to third-party research
- Third-party software/tools used under appropriate licenses
- Open source license requirements respected

8.2 Licensing Third-Party Content

Educational Materials:

- Partners may license educational content from third parties
- License terms negotiated per material and use case
- Costs allocated according to usage or shared per Agreement

Commercial Software:

- Partners obtain appropriate site licenses for software
- Compliance with software licensing terms required
- Documentation maintained

9. MORAL RIGHTS

9.1 Moral Rights Protection

All Partners recognize and protect moral rights of creators:

Right of Attribution:

- Creator's name clearly listed in all uses of work
- Creator cannot be falsely attributed as creator of work they didn't create

Right of Integrity:

- Creator may object to derogatory treatment or modification of work
- Significant modifications require creator consent

- Creator notification required before substantial changes

Right of Privacy:

- Creator may request anonymity in certain contexts
- Anonymity respected where not inconsistent with attribution requirements

9.2 Waiver of Moral Rights

- Moral rights may be waived only by explicit written agreement
- Waiver applies only to specific use case and duration
- No general waiver of all moral rights

10. DISPUTES AND CONFLICT RESOLUTION

10.1 IP Ownership Disputes

If dispute arises regarding IP ownership:

First Level - Direct Discussion:

- Affected creators and institutional representatives meet
- Written statement of positions
- Attempt to reach consensus (30 days)

Second Level - Mediation:

- If no consensus: Independent mediator appointed (CBPT Programme Director or external expert)
- Mediation process (max 60 days)
- Non-binding recommendation

Third Level - Arbitration:

- If mediation fails: Binding arbitration per main Cooperation Agreement
- Arbitration panel decides ownership and rights allocation
- Decision final and binding

10.2 Infringement and Misuse

If Partner suspects infringement of IPR or misuse of Intellectual Output:

- Reporting Partner notifies accused Partner and CBPT Programme Director
- Investigation within 30 days
- Corrective action within 60 days or dispute escalated

11. CONFIDENTIALITY AND SECRECY

11.1 Confidential Information Protection

Partners maintain confidentiality of:

- Pre-publication research results
- Potential patentable inventions (pre-filing)
- Commercial negotiations
- Trade secrets and proprietary methodologies

11.2 Disclosure Restrictions

Information may be disclosed only:

- To co-creators and collaborators (with confidentiality obligations)
- To legal advisors (with attorney-client privilege)
- To patent agents (for patent prosecution)
- To funding agencies (if required)
- To regulatory authorities (if legally required)

11.3 Publication Embargo

For inventions with patent potential:

- Publication delayed 3-6 months from invention disclosure
- Delay allows patent filing and evaluation
- Creator/Partner may request specific embargo period (up to 12 months)

12. EXTERNAL FUNDING AND SPONSORED RESEARCH

12.1 Funder IP Requirements

When Intellectual Output created through external funding:

Funding Agreement Obligations:

- Partners comply with funder's IP requirements
- Funder IP policies may override Agreement provisions (where funder is significant funder)
- Creator obligations specified in funding agreement

Common Funding IP Scenarios:

- Erasmus+ funding: IP retained by creators (typical)
- EU research project: Open access to publications required

- Industry-sponsored research: Funder may own some IP (negotiated)
- National funding: Varies per funding agency

12.2 IP Clause in Grant Applications

When Partners apply for external funding:

- IP terms specified in grant proposal
- External funder obligations disclosed to Partners
- All Partners consent to IP terms before funding acceptance

13. TERM AND TERMINATION

13.1 Term

This Agreement:

- Commences upon CBPT Programme launch
- Continues during programme operation
- Survives programme termination indefinitely for works already created
- Applies to Foreground IP created during programme operation

13.2 Termination Effects

Upon CBPT Programme termination:

- IP rights already allocated remain with creators/owners
- Licenses granted continue per Agreement terms
- Future works not covered (unless created at terminating institution)
- Data and theses remain accessible per archival provisions

13.3 Transition of Rights

If Partner Institution withdraws:

- Withdrawing Partner retains ownership of Intellectual Outputs created by its staff/students
- Remaining Partners may continue using IP under licenses established in Agreement
- New Partner (if replacement found) acknowledges existing IP rights

14. AMENDMENT AND UPDATES

14.1 Agreement Modifications

This Agreement may be amended by:

- Mutual written consent of all three Partners
- Amendments addressing:
  - Changes to national IP law affecting Partners
  - New institutional policies requiring alignment
  - Experience from programme implementation
  - Technological developments

14.2 Amendment Procedure

- Proposed amendment submitted to Partners with justification
- 60-day consultation period
- Agreement modification upon consensus of all Partners
- Amendments effective upon signature by all Rectors

15. INTEGRATION WITH INSTITUTIONAL POLICIES

15.1 Relationship to Institutional Policies

This Agreement:

- Supplements but does not replace institutional IP policies
- Where conflict: More favorable to creator applies
- Institutional policies continue to govern:
  - Employment-related IP (faculty within institutions)
  - Institutional investment and resource allocation
  - Institutional commercialization support

15.2 Policy Alignment Commitment

Each Partner commits to:

- Maintaining IP policies that support creator rights
- Transparency about institutional IP claims
- Fair assessment of Intellectual Output ownership
- Support for creator commercialization efforts

16. SIGNATURE AND EFFECTIVE DATE

On behalf of Gheorghe Asachi Technical University Iasi (TUIASI):

Rector Name: _____ Date: _____

Signature: _____ Title: Rector

IP Officer: _____ Date: _____

On behalf of Universidad de Oviedo (UNIOVI):

Rector Name: _____ Date: _____

Signature: _____ Title: Rector

IP Officer: _____ Date: _____

On behalf of Université de Rouen Normandie (URN):

Rector Name: _____ Date: _____

Signature: _____ Title: Rector

IP Officer: _____ Date: _____

APPENDIX: IP POLICIES SUMMARY

TUIASI IP Policy (Summary)

- Faculty retain copyright to scholarly works
- TUIASI claims ownership of works using significant resources
- Revenue sharing for commercialized inventions
- Moral rights guaranteed to creators
- Attribution required in all works

UNIOVI IP Policy (Summary)

- Authors retain copyright to publications
- Researchers acknowledged for inventions
- Revenue sharing for commercialization
- Institutional support for technology transfer
- Creator rights protected

URN IP Policy (Summary)

- Academic publications remain under creator copyright
- Researchers maintain invention rights (with institutional recognition)
- Revenue sharing for commercialization
- Moral rights and attribution protected
- Creator autonomy in academic matters

END OF INTELLECTUAL PROPERTY AGREEMENT

UNIVERSITATEA TEHNICĂ „GHEORGHE ASACHI” DIN IAȘI
PRORECTORATUL DIDACTIC

PROCEDURĂ
DE ORGANIZARE ȘI DESFĂȘURARE A ADMITERII ÎN CICLUL DE STUDII UNIVERSITARE DE MASTERAT
COD PO.DID.06

ELABORAT	VERIFICAT	AVIZAT	APROBAT	EDIȚIA	REVIZIA
Prorectoratul Didactic	Prorectoratul Didactic/ CEAC	Consiliul de Administrație	Senatul		
Prof.univ.dr.ing. Marinei Costei TEMNEANU	Compartimentul Managementul Calității	Prof.univ.dr.ing. Neculai Eugen SEGHEDIN	Rector, Prof.univ.dr.ing. Dan CAȘCAVAL		
Ing. Filomela BÎRSAN	Prof.univ.dr.ing. Marinei Costei TEMNEANU				
	Prof.univ.dr.ing. Ioan MÂRȘANU				
ianuarie 2025	ianuarie 2025	ianuarie 2025	21.01.2025	07.02.2025	9

Notă: Acest document conține informații care sunt proprietatea Universității Tehnice „Gheorghe Asachi” din Iași.

1. SITUAȚIA EDIȚIILOR ȘI A REVIZIILOR ÎN CADRUL EDIȚIILOR

Nr. crt.	Revizia / Data aplicării	Numărul capitolului și al paginilor revizuite	Conținutul modificării	Elaborat	Verificat	Avizat	Aprobat
1	E1RO/17.05.2006	Procedura completă	Elaborare ediția 1				

"GHEORGHE ASACHI" TECHNICAL UNIVERSITY OF IAȘI
VICE-RECTORATE FOR TEACHING

PROCEDURE
FOR ORGANIZING AND CONDUCTING ADMISSION TO THE MASTER'S DEGREE CYCLE
CODE PO.DID.06

ELABORATED BY	VERIFIED BY	ENDORSED BY	APPROVED BY	EDITION	REVISION
Vice-Rectorate for Teaching	Vice-Rectorate for Teaching/	CEAC	Board of Directors	Senate		
Prof.univ.dr.ing. Marinei Costei TEMNEANU	Quality Management Department	Prof.univ.dr.ing. Neculai Eugen SEGHEDIN	Rector, Prof.univ.dr.ing. Dan CAȘCAVAL		
Ing. Filomela BÎRSAN	Prof.univ.dr.ing. Marinei Costei TEMNEANU				
	Prof.univ.dr.ing. Ioan MÂRȘANU				
January 2025	January 2025	January 2025	21.01.2025	07.02.2025	9

Note: This document contains information that is the property of the "Gheorghe Asachi" Technical University of Iași.

1. HISTORY OF EDITIONS AND REVISIONS WITHIN EDITIONS

No.	Revision / Application Date	Revised Chapter and Page Numbers	Content of Modification	Elaborated by	Verified by	Endorsed by	Approved by
1	E1RO/17.05.2006	Full Procedure	Elaboration of 1st Edition	Ing. Delia TODEREAN			

Ing. Delia TODEREAN | prof.univ.dr.ing. Mihail VOICU | prof.univ.dr.ing. Mihail VOICU | prof.univ.dr.ing. Nicolae BADEA |
| 2 | E2RO/28.02.2007 | Procedura completă | Elaborare ediția 2 | Ing. Filomela BÎRSAN | Ing. Delia TODEREAN | prof.univ.dr.ing. Mihail VOICU | prof.univ.dr.ing. Nicolae BADEA |
| [toate intrările...] | | | | | | |

2. LISTA DE DIFUZARE

Scopul difuzării	Ex. nr.	Compartimentul	Funcția	Modalitatea de difuzare
Aplicare	3	Rectorat A1	Rector	Registru corespondență
Aplicare	3	Prorectoratul Didactic	Prorector	Registru corespondență
[toate intrările...]				

3. SCOP
Scopul prezentei proceduri este de:
- a stabili metodologia și responsabilitățile privind organizarea și desfășurarea admiterii
- a da asigurări cu privire la existența documentației adecvate
- de a asigura continuitatea activității
- de a sprijini auditul și/sau alte organisme abilitate

4. DOMENIU DE APLICARE
Prezenta procedură se aplică în Universitatea Tehnică „Gheorghe Asachi” din Iași pentru sesiunea de admitere în ciclul de studii universitare de masterat.

4.1. Date de intrare
- cerințele legale (legi, hotărâri de guvern, ordine ale miniștrilor, decizii ale Rectorului universității etc.)
- procesele care se desfășoară în cadrul universității
- competența personalului implicat
- resurse financiare alocate

prof.univ.dr.ing. Mihail VOICU	prof.univ.dr.ing. Mihail VOICU	prof.univ.dr.ing. Nicolae BADEA
2	E2RO/28.02.2007	Full Procedure	Elaboration of 2nd Edition	Ing. Filomela BÎRSAN	Ing. Delia TODEREAN	prof.univ.dr.ing. Mihail VOICU	prof.univ.dr.ing. Nicolae BADEA
[all entries...]						

2. DISTRIBUTION LIST

Purpose of Distribution	Ex. No.	Department	Function	Distribution Method
Application	3	Rectorate A1	Rector	Correspondence Register
Application	3	Vice-Rectorate for Teaching	Vice-Rector	Correspondence Register
[all entries...]				

3. PURPOSE
The purpose of this procedure is to:
- establish the methodology and responsibilities regarding the organization and conduct of admission
- provide assurance regarding the existence of adequate documentation
- ensure the continuity of the activity
- support the audit and/or other authorized bodies

4. FIELD OF APPLICATION
This procedure applies within the "Gheorghe Asachi" Technical University of Iași for the admission session to the master's degree cycle.

4.1. Input Data
- legal requirements (laws, government decisions, ministerial orders, Rector's decisions, etc.)
- processes carried out within the university
- competence of involved personnel
- allocated financial resources

4.2. Date de ieșire - concurs de admitere organizat și desfășurat 4.3. Indicator de performanță: Număr de candidați declarați admiși/ număr total de candidați înscriși la concurs 5. DOCUMENTE DE REFERINȚĂ 5.1. Legea învățământului superior nr. 199/2023 5.2. Hotărârea Guvernului nr. 1031/2024 5.3. Ordin al Ministrului Educației nr.3693/2024 5.4. Legea nr.1/2010 5.5. Metodologia de școlarizare a tinerilor de origine etnică română 5.6. Ordinul Ministrului Educației Naționale nr. 3236 din 10 februarie 2017 5.7. Ordinul Ministrului Educației Naționale nr. 3900/A10/2046/C/129/2017 din 16 martie 2017 6. METODOLOGIE 6.1. CRITERII GENERALE Art.1 (1) Admiterea în ciclul de studii universitare de masterat se organizează pe domenii, la specializările/programele de studii acreditate sau autorizate să funcționeze provizoriu. Art.2 (1) Locurile finanțate de la bugetul de stat, aprobate prin Hotărâre de Guvern, se alocă universității prin Ordinul Ministrului de resort. Art.3 Un candidat declarat admis poate beneficia de finanțare de la bugetul de stat o singură dată, pentru un singur program de studii. Art.4 Candidații care au absolvit, în regim bugetat, un program unitar de studii universitare de licență și masterat, cu o durată cuprinsă între 5 și 6 ani, pot urma un program de studii universitare de masterat numai cu taxă de școlarizare. Art.5 Un candidat poate fi admis și înmatriculat ca student la cel mult două programe de studii concomitent.	4.2. Output Data - organization and conduct of the admission contest 4.3. Performance Indicator: Number of candidates declared admitted / total number of candidates registered for the contest 5. REFERENCE DOCUMENTS 5.1. Higher Education Law no. 199/2023 5.2. Government Decision no. 1031/2024 5.3. Order of the Minister of Education no. 3693/2024 5.4. Law no. 1/2010 5.5. Methodology for the schooling of young people of Romanian ethnic origin 5.6. Order of the Minister of National Education no. 3236 of February 10, 2017 5.7. Order of the Minister of National Education no. 3900/A10/2046/C/129/2017 of March 16, 2017 6. METHODOLOGY 6.1. GENERAL CRITERIA Art.1 (1) Admission to the master's degree cycle is organized by fields, at accredited specializations/study programs or those authorized to operate temporarily. Art.2 (1) Places financed from the state budget, approved by Government Decision, are allocated to the university by Order of the relevant Minister. Art.3 A candidate that is declared admitted can benefit from state budget funding only once, for a single study program. Art.4 Candidates who have graduated, under state funding, a unified bachelor's and master's study program with a duration between 5 and 6 years, can only pursue a master's program by paying tuition fees. Art.5 A candidate can be admitted and enrolled as a student in a maximum of two study programs concurrently.

6.2. ORGANIZAREA ȘI DESFĂȘURAREA ADMITERII	6.2. ORGANIZATION AND CONDUCT OF ADMISSION
Art.6 Studiile universitare de masterat reprezintă ciclul II al studiilor universitare.	Art.6 Master's studies represent Cycle II of university studies.
Art.7 (1) La admiterea în ciclul de studii universitare de masterat pot candida cetățenii români: a) absolvenți cu diplomă de licență ai ciclului de studii universitare de licență b) absolvenți cu diplomă de licență sau echivalentă ai studiilor universitare de lungă durată c) absolvenți cu diplomă ai studiilor echivalente celor de mai sus, efectuate în străinătate	Art.7 (1) Romanian citizens eligible to apply for admission to the master's degree cycle: a) Graduates with a bachelor's diploma from a bachelor's degree cycle b) Graduates with a bachelor's diploma or equivalent from long-term university studies c) Graduates with a diploma equivalent to the above, obtained abroad
Art.8 (1) Comisia de admitere pe universitate și Comisiile de admitere pe facultăți vor asigura organizarea și desfășurarea admiterii.	Art.8 (1) The University Admission Committee and the Faculty Admission Committee will ensure the organization and conduct of admission.
Art.9 Concursul de admitere la studiile universitare de masterat se poate organiza în două sesiuni, iulie și septembrie.	Art.9 The admission contest for master's studies can be organized in two sessions, July and September.
Art.10 Concursul de admitere se va desfășura online/ onsite.	Art.10 The admission contest will be conducted online/onsite.
Art.11 (1) Desfășurarea examenului de admitere se efectuează conform metodei de selecție aprobată pentru fiecare facultate. (2) Media minimă de admitere nu poate fi mai mică decât 6,00. (3) Pentru studiile universitare organizate într-o limbă străină, admiterea va conține obligatoriu o probă de competență lingvistică.	Art.11 (1) The admission exam is conducted according to the selection method approved for each faculty. (2) The minimum admission average cannot be lower than 6.00. (3) For university studies organized in a foreign language, the admission will mandatorily include a linguistic competence test.
Art.12 (1) Înscrierea candidaților se face pe platforma informatică a universității. (2) După înscrierea online, candidații vor confirma locul prin depunerea/transmiterea dosarului cu actele în original. (3) La înscriere, candidaților li se percepe o taxă de înscriere.	Art.12 (1) Candidate registration is done on the university's IT platform. (2) After online registration, candidates will confirm their place by submitting/sending the file with the original documents. (3) Upon registration, candidates are charged a registration fee.

Art.13 (1) Pentru înscrierea la concursul de admitere, candidații vor completa o cerere de înscriere, la care anexează: a) diploma de finalizare a studiilor universitare de licență b) certificat de naștere c) acte doveditoare ale schimbării numelui (dacă este cazul) d) cartea de identitate e) adeverință medicală f) dovada achitării taxei de înscriere g) alte acte solicitate Art.14 (1) Pentru candidații cetățeni ai Republicii Moldova care au absolvit studii universitare de licență, acreditate, se repartizează un număr distinct de locuri subvenționate de la buget. Art.15 Candidații care au promovat examenul de finalizare a studiilor universitare de licență în sesiunea iulie sau septembrie din anul curent, pot prezenta la înscriere, pentru sesiunile de admitere imediat următoare, în locul diplomei de finalizare a studiilor universitare de licență, o adeverință eliberată de universitate. Art.16 (1) Candidații cetățeni ai statelor membre ale Uniunii Europene pot prezenta la înscriere, în locul atestatului de recunoaștere a studiilor, o adeverință de recunoaștere a studiilor eliberată de Centrul Național de Recunoaștere și Echivalare a Diplomelor. Art.17 (1) Întrucât candidații au dreptul legal de a se prezenta la concurs concomitent la două sau mai multe programe de studiu, dosarul cu actele în original se depune/transmite la prima opțiune. Art.18 În cererea de înscriere candidații vor menționa opțiunile lor, tipul finanțării (de la buget sau cu taxă), domeniul și programul de studiu. Art.19 Comisia de admitere pe facultate verifică zilnic dosarele candidaților înscriși și confirmă, sub semnătură, legalitatea înscrierii.	Art.13 (1) To register for the admission contest, candidates will complete an application form, to which they will attach: a) Diploma of completion of bachelor's studies b) Birth certificate c) Documents proving the name change (if applicable) d) Identity card e) Medical certificate f) Proof of payment of the registration fee g) Other requested documents Art.14 (1) For candidates who are citizens of the Republic of Moldova who have graduated from accredited bachelor's studies, a distinct number of state-subsidized places is allocated. Art.15 Candidates who passed the final exam of bachelor's studies in the July or September session of the current year can present, upon registration for the immediately following admission sessions, instead of the diploma of completion of bachelor's studies, a certificate issued by the university. Art.16 (1) Candidates who are citizens of European Union member states can present, upon registration, instead of the certificate of recognition of studies, a certificate of recognition of studies issued by the National Centre for the Recognition and Equivalence of Diplomas. Art.17 (1) Since candidates have the legal right to participate in the contest concurrently for two or more study programs, the file with the original documents is submitted/sent to the first option. Art.18 In the application form, candidates will mention their options, type of funding (state budget or fee-paying), field, and study program. Art.19 The faculty admission committee checks the files of registered candidates daily and confirms, under signature, the legality of the registration.

Art.20 Candidatul declarat admis la mai multe programe de studii universitare optează pentru programul de studii care va fi finanțat de la bugetul de stat.	Art.20 The candidate declared admitted to multiple university study programs opts for the study program that will be funded from the state budget.
6.3. REZULTATELE FINALE ALE CONCURSULUI DE ADMITERE	6.3. FINAL RESULTS OF THE ADMISSION CONTEST
Art.21 Rezultatele concursului de admitere, verificate și aprobate de comisia de admitere pe universitate, se aduc la cunoștința celor interesați prin afișare.	Art.21 The results of the admission contest, verified and approved by the university admission committee, are brought to the attention of those concerned by posting.
Art.22 (1) Afișarea rezultatelor obținute la concursul de admitere se realizează în etape: a) liste provizorii - cu ierarhizarea candidaților b) liste definitive - cu ierarhizarea candidaților, generate după soluționarea contestațiilor	Art.22 (1) The posting of the results obtained in the admission contest is done in stages: a) Provisional lists - with the ranking of candidates b) Final lists - with the ranking of candidates, generated after resolving appeals
Art.23 (1) Ierarhizarea candidaților se face strict în ordinea descrescătoare a mediilor de admitere obținute de candidați.	Art.23 (1) The ranking of candidates is done strictly in descending order of the admission averages obtained by the candidates.
7. REZOLVAREA CONTESTAȚIILOR (1) În termen de maximum 24 de ore de la afișarea rezultatelor sesiunii de admitere, candidații pot solicita clarificări suplimentare Comisiei de admitere. (2) Contestațiile sunt rezolvate la nivelul Comisiei de contestație numită prin Decizia Rectorului.	7. RESOLUTION OF APPEALS (1) Within a maximum of 24 hours from the posting of the results of the admission session, candidates can request additional clarifications from the Admission Committee. (2) Appeals are resolved by the Appeals Committee appointed by Rector's Decision.
8. DISPOZIȚII FINALE Art.24 Candidații declarați admiși sunt înmatriculați în ciclul de studii universitare de masterat în baza rezultatului concursului.	8. FINAL PROVISIONS Art.24 Candidates declared admitted are enrolled in the master's degree cycle based on the results of the contest.
9. RESPONSABILITĂȚI 9.1. Senatul universității - aprobă procedura 9.2. Rectorul universității - impune aplicarea procedurii 9.3. Comisia pentru Evaluarea și Asigurarea Calității - verifică și avizează procedura 9.4. Responsabilul de proces - Prorectoratul Didactic - respectă procedura 9.5. Decanii facultăților - aplică și respectă procedura	9. RESPONSIBILITIES 9.1. University Senate - approves the procedure 9.2. University Rector - enforces the application of the procedure 9.3. Committee for Evaluation and Quality Assurance - verifies and endorses the procedure 9.4. Process Responsible - Vice-Rectorate for Teaching - complies with the procedure 9.5. Faculty Deans - apply and comply with the procedure

10. ÎNREGISTRĂRI 10.1 Indicatorul aprobărilor și al reviziilor 10.2 Lista de difuzare 10.3 Deciziile Rectorului privind numirea comisiilor de admitere 10.4 Decizia Rectorului privind numirea comisiei de contestații 10.5 Listele candidaților înscriși la concursul de admitere 10.6 Subiectele de concurs; grilele de corectură 10.7 Lucrările candidaților (probe scrise, teste-grilă etc.) 10.8 Listele rezultatelor concursului de admitere 10.9 Listele candidaților declarați admiși 10.10 Listele candidaților declarați respinși 10.11 Statistica concursului de admitere 10.12 Deciziile Rectorului privind înmatricularea candidaților declarați admiși 11. ANEXE PO.DID.06-A1 Metoda de selecție pentru studiile universitare de masterat 12. FORMULARE PO.DID.06-F1 Cerere de înscriere la concursul de admitere PO.DID.06-F2 Cerere de înscriere la concursul de admitere aplicabilă candidaților cetățeni ai statelor membre ale Uniunii Europene PO.DID.06-F3 Cerere de eliberare a Scrisorii de acceptare, în limba engleză ANEXA 1 - METODA DE SELECȚIE A CANDIDAȚILOR PENTRU STUDIILE UNIVERSITARE DE MASTERAT | Nr. crt. | Facultatea | Metoda de selecție | Criterii de departajare | |----------|------------|--------------------|--------------------| | 1 | Facultatea de Automatică și Calculatoare | MA = 0,6*MF + 0,4*MC unde: MA – Media la concursul de admitere MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC = Media la verificarea cunoștințelor specifice domeniului de studiu (interviu) | 1. Media examenului de finalizare a studiilor	10. RECORDS 10.1 Record of approvals and revisions 10.2 Distribution list 10.3 Rector's Decisions regarding the appointment of admission committees 10.4 Rector's Decision regarding the appointment of the appeals committee 10.5 Lists of candidates registered for the admission contest 10.6 Contest subjects; correction grids 10.7 Candidates' papers (written tests, multiple-choice tests, etc.) 10.8 Lists of results of the admission contest 10.9 Lists of candidates declared admitted 10.10 Lists of candidates declared rejected 10.11 Statistics of the admission contest 10.12 Rector's Decisions regarding the enrollment of candidates declared admitted 11. ANNEXES PO.DID.06-A1 Selection method for master's studies 12. FORMS PO.DID.06-F1 Application form for the admission contest PO.DID.06-F2 Application form for the admission contest applicable to candidates who are citizens of European Union member states PO.DID.06-F3 Application for issuing the Letter of Acceptance, in English ANNEX 1 - METHOD OF SELECTION OF CANDIDATES FOR MASTER'S DEGREE STUDIES | No. | Faculty | Selection Method | Tie-breaking Criteria | |-----|---------|------------------|----------------------| | 1 | Faculty of Automatic Control and Computer Engineering | MA = 0.6*MF + 0.4*MC where: MA = Admission contest average MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (interview) | 1. Final examination average for university studies

universitare 2. Media generală de absolvire a anilor de studii la ciclul de diplomă/licență |	2. Overall graduation average of the years of study in the diploma/bachelor's cycle |
| 2 | Facultatea de Inginerie Chimică și Protecția Mediului "Cristofor Simionescu" | MA = 0,6*MF + 0,4*MC unde: MA – Media la concursul de admitere MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (interviu onsite/online) | 1. Media examenului de finalizare a studiilor universitare 2. Media generală de absolvire a anilor de studii la ciclul de diplomă/licență |	| 2 | "Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection | MA = 0.6*MF + 0.4*MC where: MA = Admission contest average MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (onsite/online interview) | 1. Final examination average for university studies 2. Overall graduation average of the years of study in the diploma/bachelor's cycle |
| 3 | Facultatea de Construcții și Instalații | MA = 0,6*MF + 0,4*MC unde: MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (interviu) | |	| 3 | Faculty of Civil Engineering and Building Services | MA = 0.6*MF + 0.4*MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (interview) | |
| 4 | Facultatea de Construcții de Mașini și Management Industrial | MA = 0,6*MF + 0,4*MC unde: MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (test online) | |	| 4 | Faculty of Machine Manufacturing and Industrial Management | MA = 0.6*MF + 0.4*MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (online test) | |
| 5 | Facultatea de Electronică, Telecomunicații și Tehnologia Informației | MA = 0.8 MF + 0.2 MC unde: MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (interviu) | |	| 5 | Faculty of Electronics, Telecommunications and Information Technology | MA = 0.8 MF + 0.2 MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (interview) | |
| 6 | Facultatea de Inginerie Electrică, Energetică și Informatică Aplicată | MA = 0.7 MF + 0.3 MC unde: MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (interviu) | |	| 6 | Faculty of Electrical Engineering, Energetics and Applied Informatics | MA = 0.7 MF + 0.3 MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (interview) | |
| 7 | Facultatea de Hidrotehnică, Geodezie și Ingineria Mediului | MA = 0.75 MF + 0.25 MC unde: MF – Media examenului de finalizare a	| 7 | Faculty of Hydrotechnics, Geodesy and Environmental Engineering | MA = 0.75 MF +

studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (interviu) | |	0.25 MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (interview) | |
| 8 | Facultatea de Mecanică | MA = 0,8*MF + 0,2*MC unde: MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (test grilă) | |	| 8 | Faculty of Mechanics | MA = 0.8*MF + 0.2*MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (multiple-choice test) | |
| 9 | Facultatea de Știința și Ingineria Materialelor | Domeniile Inginerie mecanica și Ingineria materialelor: MA = 0,5 MF + 0,5 MC Domeniul Inginerie industrială: MA = 0,3 MF + 0,7 MC unde: MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (interviu cu tematică) | |	| 9 | Faculty of Materials Science and Engineering | Mechanical Engineering Field and Materials Engineering Field: MA = 0.5 MF + 0.5 MC Industrial Engineering Field: MA = 0.3 MF + 0.7 MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC = Average for the assessment of specific knowledge in the field of study (interview on specific topics) | |
| 10 | Facultatea de Design Industrial și Managementul Afacerilor | MA = 0.5 MF + 0.5 MC unde: MF – Media examenului de finalizare a studiilor universitare (licență sau diploma) MC - Media la verificarea cunoștințelor specifice domeniului de studiu (interviu) | |	| 10 | Faculty of Industrial Design and Business Management | MA = 0.5 MF + 0.5 MC where: MF = Final examination average for university studies (bachelor's or diploma degree) MC - Average for the assessment of specific knowledge in the field of study (interview) | |

Joint Master's Program in Chemical and Biochemical Process Technology

MASTER
acordată de cele trei universități partenere: Universitatea Tehnică „Gheorghe Asachi" din Iași (România), Universitatea din Oviedo (Spania) și Universitatea din Rouen Normandia (Franța).

MÁSTER
expedido en colaboración internacional por la Universidad Técnica "Gheorghe Asachi" de Iași (Rumanía), junto con la Universidad de Oviedo (España) y la Universidad de Rouen Normandía (Francia).

MASTER
délivré en partenariat international par l'Université Technique "Gheorghe Asachi" of Iasi (Roumanie) avec l'Université d'Oviedo (Espagne) et l'Université de Rouen Normandie (France).

ROMÂNIA

MINISTERUL EDUCAȚIEI ȘI CERCETĂRII

În baza absolvirii Ciclului II – Studii universitare de masterat și a promovării examenului de finalizare a studiilor din sesiunea..... la propunerea Facultății de Inginerie Chimică și Protecția Mediului "Cristofor Simionescu", Universitatea Tehnica Gheorghe Asachi din Iasi,

conferă

…… născut în anul ..... luna ..... ziua .....absolvent a Universității Tehnice „Gheorghe Asachi" din Iași (România), Universității din Oviedo (Spania) și Universității din Rouen Normandia (Franța).

titlul de MASTER

în domeniul de studii Inginerie chimică programul de studii TEHNOLOGIA PROCESELOR CHIMICE ȘI BIOCHIMICE (CHEMICAL AND BIOCHEMICAL PROCESS TECHNOLOGY), forma de învățământ cu frecvență, studii integrate, durata studiilor 2 ani, numărul de credite de studii transferabile (ECTS) 120

Titularul diplomei beneficiază de toate drepturile legale.

Rector,

Secretar sef,

Nr. ..... din .....

Semnătura titularului .....

ESPAÑA

FELIPE VI, REY DE ESPAÑA

y en su nombre
el/la Rector/a de la UNIVERSIDAD DE OVIEDO

Considerando que, conforme a las disposiciones y circunstancias previstas por la legislación vigente,

Don/Doña ……

nacido/a el DD de MES de AAAA en ……., de nacionalidad ……,

ha superado en modalidad presencial en MES de AAAA, los estudios conducentes al TÍTULO CONJUNTO oficial de MÁSTER UNIVERSITARIO en

TECNOLOGÍA DE PROCESOS QUÍMICOS Y BIOQUÍMICOS

por la Universidad Técnica "Gheorghe Asachi" de Iași (Rumanía), la Universidad de Oviedo (España) y
la Universidad de Rouen Normandía (Francia),

establecido por Acuerdo de Consejo de Ministros de DD de MES de AAAA expide el presente título oficial con validez en todo el territorio nacional, que faculta a el/la interesado/a para disfrutar los derechos que a este título otorgan las disposiciones vigentes.

Dado en …….. a … de ……. de …..

El/La interesado/a, El/La Rector/a, Los/as Rectores/as,

El/La Jefe/a de la Secretaría,

Número de registro

RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE

Vu le Code de l'éducation, notamment son article L. 613-1 ;
Vu les textes réglementaires autorisant l'université de Rouen Normandie à délivrer le diplôme ;
Vu l'arrêté du 27 juin 2022 accréditant l'Université de Rouen Normandie en vue de la délivrance de diplômes nationaux ;
Vu les procès-verbaux du jury ;
Le diplôme national de Master de SCIENCES, TECHNOLOGIES, SANTE, mention **INGENIERIE DE LA SANTE**, **Parcours type TECHNOLOGIE DES PROCEDES CHIMIQUES ET BIOCHIMIQUES** est délivré à (Mme ou M) (prénom, NOM patronymique), date de naissance le ……..à ……..

au titre de l'année universitaire.....et confère le **grade de Master,** pour en jouir avec les droits et prérogatives qui y sont attachés.

Fait le …..

Signature du chef d'établissement

Le recteur de la région académique
Chancelier des universités

Numéro du diplôme