ARISTOTLE UNIVERSITY THESSALONIKI, GREECE | AUTH Gateway

Departments of Chemistry (expedited), Physics and Mechanical Engineering

Interdepartmental Foreign Language Undergraduate Program of Studies Materials Science and Engineering

Regulations for studies, internships, mobility and thesis preparation

February / 2026

(English)

In the following text, Joint Undergraduate Program of Studies in English, or JEUPS refers to the Joint Undergraduate Program of Studies in English "Materials Science and Engineering"

A. Regulation of Studies

(Excerpt from the 15-01-2026 – 38744 Decision of the Senate of Aristotle University of Thessaloniki)

Article 1
Awarded Title of Joint Undergraduate Program of Studies in English (JEUPS)

The JEUPS of the Schools of Chemistry (coordinator), Physics, and Mechanical Engineering of the Aristotle University of Thessaloniki awards a Bachelor of Science in Materials Science and Engineering in its 4-year version, and a degree leading to the award of a unified and indivisible postgraduate level degree (Diploma with Integrated Master in Materials Science and Engineering) in its 5-year version.
The successful completion of studies corresponds to Level six (6) for the 4-year version of the program and Level seven (7) for the 5-year version, according to the National and European Qualifications Framework, in accordance with the provisions of Article 47 of Law 4763/2020 (Government Gazette A' 254).

Article 2
Categories of Applicants

Eligible to apply are foreign applicants who fall into one of the following categories:

a) Graduates of high schools or equivalent schools with a physical seat abroad. Interested parties, provided they have attended with full attendance the last two (2) grades of high school or an equivalent school in a foreign country, shall submit a high school diploma or other equivalent secondary education title, which grants them the right of admission to higher education institutions in the country of graduation.

b) Graduates of a recognized foreign school of other European Union member states or third countries, legally established and operating in Greece, the title of which grants them the right of admission to higher education institutions based in the country whose educational curriculum the said foreign school of graduation follows, provided that:

ba) they themselves and their parents do not hold Greek citizenship and

bb) they have attended at least the last two (2) grades of high school with full attendance.

c) Students of higher education institutions abroad, who hold the certificate of par. 1 of article 314A of Law 4957/2022, in order to continue their studies in a corresponding semester and be awarded a degree by the **JEUPS**.

Foreign schools operating in Greece must be recognized for the legality of their operation by the locally competent Directorate of Secondary Education.

The authenticity verification of the high school diploma and the candidate's transcript of records may be conducted:

a. with an APOSTILLE stamp, provided the country of origin of the documents is a member of the Hague Convention Abolishing the Requirement of Legalisation for Foreign Public Documents,

b. with certification by a notary public (notarial act),

c. with validation by the Ministry of Foreign Affairs and/or the Ministry of Education of the issuing country,

d. with the submission of the diploma and/or the transcript and simultaneous notification of the foreign school by the interested party. The notification is accompanied by an official email from the foreign school, enabling the **Secretariat of the JEUPS** to verify the authenticity of said documents.

Proof of English language proficiency

Applicants are required to demonstrate English language proficiency of at least level B2, according to the Common European Framework of Reference for Languages (CEFR), in one of the following ways:

a. English as a native language.

b. Possession of a language proficiency certificate of at least level B2 from a recognized examination body, in accordance with the current decisions of the Supreme Council for Civil Personnel Selection (ASEP) or the Ministry of Education regarding recognized language proficiency titles.

c. A degree from a Department of Foreign Language and Literature or a Department of Foreign Languages, Translation, and Interpreting in Greece, or an equivalent title from a recognized institution abroad.

d. A Bachelor's / Master's / Doctorate from a recognized **HEI** abroad, provided the program is conducted entirely in English.

e. A high school diploma, provided that the candidate has attended at least the last two (2) years of secondary education in a school with English as the official language of instruction.

f. The license of teaching proficiency for a foreign language does not constitute proof of knowledge of that language, as the submission of a certified copy of the degree based on which the license was issued is required, as well as its official translation, if necessary.

Article 3
Admitted Students, Selection Criteria and Required Documents

The annual number of admitted students to the **JEUPS** “Materials Science and Engineering” is set at a maximum of forty (40) undergraduate students, while the minimum number of admitted students for the operation of the **JEUPS** is set at twenty-one (21) undergraduate students. Upon recommendation by the **Steering Committee** and decision by the **Senate**, published in the Government Gazette, the minimum and maximum number of admissions may be altered in each cycle of the Program. In the event of a tie among candidates, the candidates who tie with the last successful applicant are admitted to the **JEUPS**, according to their evaluative ranking and up to the completion of the maximum number (forty).

The selection of admitted student is based on the applicants' CV following an evaluation of the file and documents by the **Steering Committee** and the participation of the candidates in the selection process. This includes an oral interview conducted online by members of the Committee, which assesses communication and reasoning skills, academic and personal readiness, and general understanding of issues related to materials science and engineering. By decision of the **Steering Committee**, which is stated in the call for applications, a knowledge test in the English language may be conducted prior to the interview, in a form and on topics to be specified each time by said call. The relevant call for applications and the corresponding required documents are published on the program's website every March.

Applications are submitted electronically throughout the year and until the available positions are filled. Prospective students are invited to submit their applications accompanied by the necessary documents to the **Secretariat of the JEUPS** in electronic form. The English language knowledge test and the interviews are conducted on predetermined dates set by the **Steering Committee**, while the ranking of evaluation follows the chronological order of receipt of the applications. The relevant call and the corresponding required documents are published on the Program's website.

The candidate submits the following documents:

- Application form for participation in the **JEUPS**, available in electronic form on the Program's website.
- Photocopy (both sides) of the Identity Card or Passport.
- High School Diploma (with an official translation into English).
- Official transcript of grades for all subjects of the final year high school education (with an official translation into English), indicating that the applicant has successfully been examined in Mathematics, Physics, and Chemistry courses or in the corresponding subjects as described in the relevant certificate.
- Certificate of English language proficiency of at least level B2.
- Motivation Letter of up to five hundred (500) words, presenting the candidate's interest in materials science and engineering, the motive for attending the program, and their future goals.
- Short curriculum vitae (CV) including information on studies, distinctions, volunteering, or other activities related to the subject.

The selection criteria and documents described above may be modified following a proposal by the **Steering Committee** and approval by the **Senate** of AUTh.

Additionally, the following optional academic criteria are taken into positively consideration during the evaluation of the applicants file:

- Minimum overall high school diploma grade: seventy percent (70%) of the maximum grade or equivalent.
- Certifications for entry into **higher education**, such as:
    - International Baccalaureate (IB): at least 28/45,
    - GCE A-levels: at least ABB in 3 courses, with particular emphasis on courses related to the subject matter of the program,
    - Advanced Placement (AP): Score of 4 or 5 in relevant courses such as Chemistry, Physics, Mathematics,
    - SAT / ACT: SAT: ≥ 1000/1600, ACT: ≥ 25/36,
    - TSA (Thinking Skills Assessment): ≥ 60/100 or raw score ≥ 25/50.

For the evaluation and selection of applicants, these additional criteria are co-evaluated, which are defined and may be reformed following a recommendation by the **Steering Committee** and in accordance with the current legal framework.

The relevant original documents, if deemed necessary, may be requested from the applicant to be sent by mail or submitted in person to the **Secretariat of the JEUPS**.

The final selection process of the applicants for the Program is carried out by the **Steering Committee** as follows: The Committee compiles a complete list of all applicants and, after the relevant check, rejects those who do not meet the minimum criteria set by the institutional framework and the **Internal Regulation of the JEUPS**, and invites the qualified applicants who have gathered the required documents for an interview. After the completion of the process [evaluation based on the document file, interview, and knowledge test (if applicable)], the final list of successful candidates is compiled.

The final list of successful candidates and any runners-up is ratified by the **Steering Committee**. The selection process, the issuance of results, and the registration of successful candidates must be completed by September 30th of each academic year, subject to the filling of vacancies resulting from students who voluntarily withdrew from the Program by interrupting their studies. These positions are filled in order of priority from the runners-up list compiled by the **Steering Committee** during the evaluation of applications.

Furthermore and supplementary to the above, the possibility of enrollment is provided to students of foreign **higher education institutions** who hold a certificate of evaluation for periods of study completed at a recognized foreign **HEI** (par. 1 of article 314A of Law 4957/2022 as amended by article 128 of Law 5094/2024), in the **JEUPS** "Materials Science and Engineering" of AUTh, in order to continue their studies and be awarded the corresponding degree.

The student submits an application with the required documents to the **Secretariat of the JEUPS** in printed or electronic form, through the Electronic Registration Information System of the Ministry of Education, Religious Affairs, and Sports.

Vacant Positions

In the event of a student's withdrawal or removal, the **Steering Committee** may, by a specifically reasoned decision, proceed to fill the vacated position, in order to ensure the smooth operation of the Program by maintaining a stable number of students in each year of study.

The vacant position may be filled by students attending the same or a higher **Semester** of study at internationally recognized foreign **higher education institutions**.

The selection of candidates can be made either from candidates who had submitted an application in the initial submission cycle or through a separate public invitation.

Interested parties are invited to provide the following documents:

- Copy of identity card or passport,
- High School Diploma (original and official translation into English),
- Grades of all courses of the last grade of High School (original and official translation into English),
- Transcript of records from the original **Faculty/School** (in cases of par. 1 of Art. 314A of Law 4957/2022),
- Official **Curriculum** of the original **Faculty/School** for academic equivalence check (in cases of par. 1 of Art. 314A of Law 4957/2022),
- Proof of English language proficiency according to the relevant section of Article 4 of this Regulation,
- Letter of intent, and
- Curriculum vitae (CV).

The Committee evaluates the candidates' files and may call for an interview before issuing the final decision.

Objections to the results may be filed within five (5) working days from the notification of the results, by written application to the **Secretariat of the JEUPS**.

The registration of successful candidates takes place following a relevant announcement by the **Secretariat of the JEUPS** within fifteen (15) days, by submitting any necessary documents. In the event that a candidate does not register within the prescribed deadline by paying the relevant down payment of the tuition fees, it is taken as a refusal to accept the position, which is covered by the next runner-up.

It is clarified that applications and the potential acceptance of candidates concern exclusively the academic year specified in each call for applications. No provisional admission is provided for subsequent academic semesters or years, regardless of cause, including, indicatively, military service or personal obligations. Candidates wishing to attend in a subsequent year must re-apply in a future cycle and its corresponding call.

Exceptionally, the **Steering Committee** may, by a reasoned decision, approve the postponement of the start of studies for one academic year, provided there are serious reasons sufficiently documented by the interested candidate. The relevant decision on granting or not granting the postponement rests exclusively with the discretion of the Committee.

Article 4
Duration and Conditions of Study.

The duration of study in the **JEUPS** “Materials Science and Engineering” in the 4-year version of the program leading to the award of a **Bachelor of Science in Materials Science and Engineering** is set at eight (8) academic **Semesters** of full-time study, and in the 5-year version of the program leading to the award of a **Diploma with Integrated Master in Materials Science and Engineering** is set at ten (10) academic **Semesters** of full-time study. The maximum duration of study is defined as this time, increased by four (4) and six (6) academic **Semesters** respectively. Students who have chosen the four-year cycle of studies have the possibility to continue to the 5th year leading to the award of the **Diploma with Integrated Master**.

The program of each semester-long course has a duration of thirteen (13) weeks and is developed through lectures, laboratory exercises, submission of assignments, etc., depending on the requirements of the course and the choice of each **Lecturer**.

All courses are carried out **in person** utilizing the infrastructure of the **Schools** of Chemistry, Physics, and Mechanical Engineering. Provision is made for the exceptional use of **Synchronous Distance Learning** methods for the provision of teaching work conducted with the participation of Professors from foreign institutions or Collaborating Professors, in cases of force majeure or extraordinary circumstances where **in-person** conduct of the educational process or the use of the infrastructure of the **Schools** of Chemistry, Physics, and Mechanical Engineering is not possible for the conduct of educational, research, and other activities, and for the organization of in-depth courses and tutorial exercises beyond the mandatory teaching hours per course. The conduct of distance learning courses is carried out through the use of ICT, utilizing the logistical infrastructure of the **Schools** of Chemistry, Physics, and Mechanical Engineering, as well as the expertise and support of the **Digital Governance Unit** of AUTh.

The minimum duration of study in the **JEUPS** for the award of the degree amounts to eight (8) and ten (10) academic **Semesters**, while the maximum duration of study is defined as this time, increased by four (4) and six (6) academic **Semesters** for the 4-year and 5-year version of the program respectively.

After the completion of the maximum duration of study of fourteen (14) and sixteen (16) **Semesters**, and without prejudice to the provisions in force each time according to the current legislation on **HEIs**, an act of removal of the student is issued by the competent body of the **JEUPS**.

Provided that the registration has been completed and all prescribed procedures regarding the formally established commencement of studies have been finished, students who have not exceeded the maximum study limit of par. 1 may apply for a suspension of studies for a period of time not exceeding a total of two (2) academic years. The right to suspend studies may be exercised once or partially for a period of at least one (1) academic **Semester**, but the duration of the suspension cannot cumulatively exceed two (2) years if granted partially. Student status is suspended during the time of study suspension and participation in any educational process is not permitted. The time of study suspension is not counted towards the maximum duration of regular study, while upon resumption of studies, students return to regular study status with all the rights and obligations provided for by the Program. The relevant procedure is initiated by a written application of the interested student to the **Secretariat of the JEUPS**, accompanied by the necessary documents as the case may be, and is evaluated by the **Steering Committee**.

For serious health reasons related to the person of the student or to a first-degree relative by blood, or a spouse, or a person with whom the student has entered into a cohabitation agreement, an exceptional exceeding of the maximum duration of study is provided, not exceeding one (1) year. This exceeding is approved by the **Steering Committee**, following a fully reasoned and sufficiently documented application by the student, and cannot exceed two (2) consecutive academic **Semesters**.

The **JEUPS** does not provide the possibility of part-time study.

On issues of re-examination of failed courses or removal for reasons such as: a) insufficient progress of the student (which is documented by lack of participation in the educational process: attendance, examinations), b) conduct that violates academic ethics, and c) application by the student themselves, the **Steering Committee** shall decide.

Article 5
Student Rights and Obligations - Responsibilities

Within the framework of the social policy of the Schools of Chemistry, Physics, and Mechanical Engineering, in collaboration with the Equitable Access Unit of the Aristotle University of Thessaloniki, the full, equal, and substantial participation of all students with disabilities or special educational needs in all educational, research, and administrative activities of the Faculty in general and the JEUPS specifically is ensured.

Access to the teaching and examination areas of the Schools of Chemistry, Physics, and Mechanical Engineering is facilitated through appropriate infrastructure, such as ramps, special bars, and elevators. For students who, due to disability or learning difficulties, are unable to participate in written examinations, the possibility of an oral examination is provided, either in person in an accessible room or remotely via a digital teleconferencing platform.

Students enroll and participate in the JEUPS under the terms and conditions provided for in this Regulation. The students of the program have all the rights, benefits, and facilities provided for the students of the Greek-taught study program, except for the right to be provided with free textbooks. Also, meals at the University Student Club of AUTh are provided upon payment of a small fee, as determined by the respective operating regulation of the Club.

Students admitted to the JEUPS are obliged:

1. To attend all courses of the Curriculum, regardless of whether they are conducted with physical presence or, exceptionally, remotely, provided the latter has been approved by the competent bodies of the Program. Participation in courses, exercises, examinations, public lectures, and other educational activities is mandatory. Students are entitled to absences of up to thirty percent (30%) of the total teaching hours of each course per semester. In case of a serious and justified impediment, it is possible to make up for the teaching hours, following consultation with the Lecturer and with the approval of the Program Steering Committee.
2. To submit the required assignments on time, provided they are prescribed for the respective course by the responsible Lecturer.
3. To declare in a timely manner courses from previous years that they have not successfully passed, at the beginning of each semester. Declarations are registered electronically through the Electronic Secretariat service and are included in the student's individual record. Mandatory declaration is required in the final year for elective courses.
4. To procure or borrow the necessary textbooks, based on those recommended by the person responsible for each course, if deemed necessary.

5. To systematically monitor the announcements of the Program and the Secretariat, regularly checking their electronic correspondence.
6. To issue an academic identity card through the competent electronic service of the Ministry of Education, Religious Affairs, and Sports.
7. To pay the tuition fees on time before the winter (1st) and the spring (2nd) semester of each academic year, according to the specified deadlines.
8. To have settled every financial or other obligation towards the Program and the Institution before their graduation. Otherwise, they do not have the right to participate in their degree award ceremony.
9. In the case of a scholarship with a reciprocal nature, to provide the prescribed work, which may concern the support of the educational or research operation of the Program, the library, or other needs of the School.
10. To respect the decisions of the Program bodies and to adhere to the rules of academic ethics.

Systematic or serious violation of the obligations arising from this Regulation, without sufficient and documented justification, may result in failure in a course, or, in serious cases, exclusion from educational activities and/or the removal of the student from the Program, following a decision by the Steering Committee.

The same penalty may be imposed in cases of disciplinary offenses that offend the academic community and the dignity of its members, such as sexist, racist, homophobic, or transphobic behavior, verbal or physical violence, inappropriate behavior in university premises, as well as any action that runs contrary to the principles of respect, equality, and inclusion. Finally, the Committee reserves the right to refer relevant cases to the competent disciplinary bodies of the Institution or, if there are grounds, to transmit them to the competent authorities of the legal order, in accordance with the current legislation.

The Schools of Chemistry, Physics, and Mechanical Engineering of AUTh provide the institution of the Academic Study Advisor. The role of the Academic Advisor is to advise students for the successful completion of their studies and, based on their individual goals, to suggest guidance and solutions for any problems that arise and hinder the successful completion of studies. The list of Academic Advisors is announced by the Secretariat on the School's website with contact details. All TRS and Laboratory Teaching Staff members are obliged to perform the duties of Academic Study Advisor, and the appointment is made after the registration of new students, at the beginning of each academic year. New students should immediately contact their assigned Academic Advisor at the beginning of the winter semester of the year of entry into the School. Subsequently, they are encouraged to maintain at least one communication per semester with their respective Academic Advisor. The Academic Advisor is committed to indicating solutions in the event that a student faces a problem related to the smooth monitoring of their studies, according to the study regulation of the School and the broader regulation of AUTh, and also to respect personal data in accordance with the code of ethics and conduct.

Article 6
Curriculum - Student Evaluation

The Joint Undergraduate Program of Studies in English (JEUPS) “Materials Science and Engineering” offers a full-time Curriculum, with the option of choice, lasting four (4) and five (5) academic years, which is structured into eight (8) and ten (10) academic Semesters respectively. The program includes fifty-eight (58) courses in total, of which forty (40) are

Mandatory Courses and eighteen (18) are Mandatory Major Courses. The distribution of courses is, as a general rule, five (5) courses per semester.

Mandatory Courses (M) in the case of the five-year integrated cycle of studies. The student is required to attend and successfully be examined in forty (40) mandatory courses, from which they will accumulate two hundred and thirty-four (234) credits (ECTS) during their studies. The mandatory courses aim to provide the student with the fundamental knowledge and methodology of the subject areas that traditionally constitute the core of Materials Science and Engineering worldwide.

Mandatory Major Courses (K) in the case of the five-year integrated cycle of studies. Three (3) majors are offered (Materials Manufacturing and circular economy, micro and nanotechnology engineering, Biomaterials and Biotechnology) with eighteen (18) mandatory major courses (K), from which the student must choose to attend during the seventh (7th) and eighth (8th) Semester of studies, three (3) courses per semester—two (2) per semester from the chosen major and one (1) per semester from any other major and in any combination they desire, so that, having successfully passed six (6) courses in total, they accumulate an additional thirty-six (36) credits (ECTS) during their studies. Major courses (K) aim to introduce the student, by their choice, into the logic of more specific subject areas. During the ninth (9th) and tenth (10th) Semester, the student will conduct a diploma thesis from which they will accumulate 30 ECTS, and a total of 300 ECTS. The successful completion of the Program corresponds to three hundred (300) credits (ECTS).

In the case of the four-year cycle of studies, Semesters 1 to 7 are exactly the same with the same number of courses as the five-year integrated cycle of studies. The student is required to attend and successfully be examined in thirty-four (34) mandatory courses, from which they will accumulate two hundred and four (204) credits (ECTS) during their studies. In the fourth year, the three (3) majors are offered with eighteen (18) major courses (K) as in the 5-year cycle of studies, from which the student must choose to attend three (3) courses during the seventh (7th) Semester and one (1) during the eighth (8th), so that, having successfully passed these, they accumulate a total of twenty-four (24) ECTS during their studies. During the eighth (8th) Semester, the student will conduct a diploma thesis from which they will accumulate 12 ECTS, and a total of 240 ECTS. The successful completion of the Program corresponds to two hundred and forty (240) credits (ECTS). The only difference is that in the 8th Semester, instead of choosing three (3) major courses from their selected major, students choose 1 major course and have the possibility to conduct a diploma thesis.

The maximum percentage of students per major cannot exceed forty percent (40%) of the total number of students.

Teaching is carried out in person, with provision for the use of digital support for educational material and communication between students and Lecturers via the e-learning platform of AUTh. Attendance of courses is mandatory, and absences exceeding thirty percent (30%) of the teaching hours of each Semester are not permitted, unless there are documented reasons of force majeure.

The academic year is structured into two (2) Semesters (winter and spring), each of which contains thirteen (13) weeks of teaching, with an examination period at the end of each Semester. The successful completion of studies for the award of the title presupposes the accumulation of three hundred (300) ECTS for the five-year (5) cycle of studies and the accumulation of two hundred and forty (240) ECTS for the four-year (4) cycle.

The language of instruction for all courses is English. Students have access to optional courses on Greek terminology, especially during the fourth (4th) year, aiming to facilitate those wishing to continue their professional career in Greece, as well as courses of special interest. The program does not provide for a mandatory internship; however, counseling support and opportunities to participate in research programs are offered, and it provides the possibility for those who wish to additionally participate in international mobility programs.

Πρόγραμμα σπουδών Επιστήμης και Μηχανικής Υλικών

Code	CURRICULUM | Mandatory Courses	Hours/week	ECTS
	1st Semester	**[20]**	**[30]**
MSEN 101	Introduction to Materials Science and Engineering	4	6
MSEN 102	Fundamentals of Chemistry	4	6
MSEN 103	Physics for Scientists and Engineers I – Mechanics & Waves	4	6
MSEN 104	Mathematics I – Algebra, Analytic Geometry and Introduction to Calculus	4	6
MSEN 105	Materials Informatics	4	6
	2nd Semester	**[20]**	**[30]**
MSEN 201	Organic Chemistry	4	6
MSEN 202	Fundamentals of Chemistry Laboratory	4	6
MSEN 203	Physics for Scientists and Engineers II– Electricity & Magnetism	4	6
MSEN 204	Mathematics II – Advanced Calculus	4	6
MSEN 205	Bonding, Crystallography, Crystal Defects	4	6
	3rd Semester	**[20]**	**[30]**

MSEN 301	Physical Chemistry	4	6
MSEN 302	Organic Chemistry Laboratory	4	6
MSEN 303	Data Analysis – Statistics	4	6
MSEN 304	Thermodynamics	4	6
MSEN 305	Introduction to Solid Mechanics	4	6

4th Semester [20] [30]

MSEN 401	Inorganic materials chemistry	4	6
MSEN 402	Physical Chemistry Laboratory	4	6
MSEN 403	Design and Analysis of Materials Experiments	4	6
MSEN 404	Condensed Matter Physics	4	6
MSEN 405	Polymer Science and Engineering: Theory and Laboratory	4	6

5th Semester [20] [30]

MSEN 501	Inorganic Materials Chemistry Laboratory	4	6
MSEN 502	Materials Characterization	4	6
MSEN 503	Ceramics	4	6
MSEN 504	Chemical Process Engineering	4	6
MSEN 505	Mechanical Behavior of Engineering Materials	4	6

6th Semester [20] [30]

MSEN 601	Design of materials in the atomic scale	4	6
MSEN 602	Materials Characterization Laboratory	4	6
MSEN 603	Industrial Process Design and Economics	4	6
MSEN 604	Engineering Laboratory (mechanical testing, non-destructive testing)	4	6

MSEN 605	Composite materials	4	6

	7th Semester	**[20]**	**[30]**
MSEN 701	Materials selection in engineering design	4	6
MSEN 702	Materials Processing	4	6
Area 1: *Materials Manufacturing and Circular Economy*			
MSEN 711	*Fundamentals of Additive Manufacturing*	4	6
MSEN 712	*Powder metallurgy*	4	6
MSEN 713	*Materials Circular Economy and LCA*	4	6
Area 2: *Micro and Nanotechnology Engineering*			
MSEN 721	*Surfaces and Interfaces and Thin-Film Materials Science*	4	6
MSEN 722	*Nanomaterials and Nanotechnologies*	4	6
MSEN 723	*Fundamentals of Semiconductor Materials*	4	6
Area 3: *Biomaterials and Biotechnology*			
MSEN 731	*Bio- organic materials*	4	6
MSEN 732	*Biochemistry Theory and Laboratory*	4	6
MSEN 733	*Bio inorganic materials for biomedical and clinical applications*	4	6

	8th Semester	**20**	**30**
MSEN 801	CAD-CAE in materials	4	6
MSEN 802	Deformation and Failure of Engineering Materials	4	6

Area 1: *Materials Manufacturing and Circular Economy*			
MSEN 811	Solidification, Casting and Welding	4	6
MSEN 812	*Waste Valorization and Advanced Recycling Technologies*	4	6
MSEN 813	*Critical raw materials*	4	6
Area 2: *Micro and Nanotechnology Engineering*			
MSEN 821	*Optoelectronics and Sensors: Materials and Applications*	4	6
MSEN 822	*Materials and systems in Energy Technologies*	4	6
MSEN 823	*Electronic Materials Processing*	4	6
Area 3: *Biomaterials and Biotechnology*			
MSEN 831	*Bio-inspired Engineering*	4	6
MSEN 832	*Biomechanics*	4	6
MSEN 833	*Structural Biochemistry and Bioinformatics*	4	6
*Diploma Thesis			12

9th Semester	**20**	**30**

MSEN 901	Computational Methods in Engineering Design	4	6
MSEN 902	Materials and Environment	4	6
MSEN 903	Research Methodology	2	3
MSEN 904	Diploma Thesis I		15

10th Semester	**20**	**30**

MSEN 1001	Smart Materials and Systems	4	6
MSEN 1002	AI and Machine learning in materials science and engineering	4	6

MSEN 1003	Seminars (soft skills, entrepreneurship & innovation, IP rights, patents, startups)	2	3
MSEN 1004	Diploma Thesis II		15

Περιεχόμενο Μαθημάτων

I. Courses in Greek

Υποχρεωτικά Μαθήματα

A. MANDATORY COURSES

[MSEN 101] – Introduction to Materials Science and Engineering

COURSE CONTENT: This course provides a comprehensive introduction to Materials Science and Engineering, focusing on the fundamental relationships between structure, properties, processing, and performance of materials. It presents the materials paradigm and highlights key design trade-offs that engineers face when selecting materials for specific applications. The course introduces the main classes of materials and their typical uses, alongside the concept of microstructure and its critical role in determining material behavior. Atomic bonding, crystal structures, and amorphous solids are examined to establish an understanding of how materials are built at the atomic scale. Common crystal defects, including vacancies, dislocations, and grain boundaries, are discussed together with basic diffusion concepts. The fundamentals of phase diagrams, phases, the lever rule, eutectic systems, and an introduction to phase transformations are also covered. Mechanical behavior is addressed through elastic and plastic deformation, strengthening mechanisms, and fracture basics. An overview of functional properties—electrical, thermal, magnetic, and optical—is provided, along with corrosion fundamentals. Finally, the course introduces major processing routes, modern manufacturing approaches, materials selection concepts, and sustainability considerations.

[MSEN 102] – Fundamentals of Chemistry

COURSE CONTENT: This course provides a comprehensive introduction to Chemistry, integrating fundamental concepts from inorganic, physical, and organic chemistry to build a coherent understanding of matter at the atomic and molecular levels. In Part 1, key principles of inorganic chemistry are introduced, including atomic structure, electromagnetic radiation, quantum mechanics, and electronic structure, with emphasis on periodic trends and the nature of chemical bonding. Ionic and covalent bonding models are explored through Lewis structures, VSEPR theory, valence bond theory, and molecular orbital theory, extending to solids, acids, and bases. Part 2 focuses on introductory physical chemistry, examining states of matter, gas laws, intermolecular forces, phase equilibria, and the molecular basis of liquids and solids. The interaction of light with matter is presented through rotational, vibrational, electronic, IR, Raman, and UV–visible spectroscopy, highlighting spectroscopy as a powerful structural tool. Electrolyte solutions and acid–base behavior in aqueous systems are also covered. Part 3 introduces organic chemistry, emphasizing structure, bonding, reaction types, stereochemistry, hydrocarbons, aromatic systems, and functional groups relevant to organic materials, along with NMR spectroscopy and its applications.

[MSEN 103] – Physics for Scientists and Engineers I – Mechanics & Waves

COURSE CONTENT: This course provides a foundational understanding of how objects move and interact, and how mechanical waves propagate. The course focuses on core principles that underpin all of classical mechanics and wave phenomena. It establishes the mathematical and conceptual tools needed for advanced physics and engineering.

[MSEN 104] – Mathematics I - Algebra, Analytic Geometry and Introduction to Calculus

COURSE CONTENT: This course builds the mathematical foundation required for advanced study in materials engineering, emphasizing algebraic methods, geometric interpretation, and introductory calculus tools used in material behavior modeling, structural analysis, and process calculations.

1. Algebra (Engineering Foundations): Essential for material property calculations and processing equations. Applicable to stress–strain relationships, thermal expansion, and phase boundaries.
2. Analytical Geometry for microstructure imaging, crystallography projections, and mechanical plotting, modeling stress distributions, heat transfer paths, and optical properties, crystallographic directions, force systems, and material deformation analysis.
3. Introduction to Calculus: foundational for understanding rate-based material processes, Rates of change in thermal/chemical processes, Optimization in materials design and processing, identifying maximum strength points, minimum energy configurations, and analyzing dynamic systems. Accumulated change in heat or mass transport, Foundation for later courses in thermodynamics and transport phenomena.
4. Relevance to Materials Engineering: Students learn mathematical tools that support: Mechanical behavior and elasticity analysis, Diffusion and kinetics modeling. Thermal processes and phase transformation calculations, Data analysis from material testing, Engineering design and optimization

[MSEN 105] – Materials Informatics

COURSE CONTENT: The Material Informatics course aims to cultivate computational problem-solving skills. Upon completion of the course, students should be able to use a computer for problem-solving, as well as for data analysis and the creation of basic simulations. More specifically, they should be able to theoretically analyze a problem, formulate a solution algorithm, and solve it practically by developing an appropriate computer program, adhering to fundamental programming principles. The final grade is determined by examinations as well as the evaluation of assignments and projects. The course utilizes the MATLAB computational environment and programming language, while also including elements of Python.

[MSEN 201] – Organic Chemistry

COURSE CONTENT: This course provides a comprehensive introduction to Organic Chemistry, emphasizing the relationship between molecular structure, bonding, reactivity, and properties of organic compounds. It begins with fundamental concepts of structure and bonding and an overview of organic reactions, establishing the mechanistic framework needed to understand chemical transformations. Stereochemistry at tetrahedral centers is introduced to explain three-dimensional molecular structure and its impact on chemical behavior. The chemistry of hydrocarbons is examined in detail, covering alkanes, cycloalkanes, alkenes, and alkynes, with emphasis on reactivity, reaction mechanisms, stereochemistry, and synthetic strategies. The course then explores organohalides, focusing on nucleophilic substitution and elimination reactions of alkyl halides. Methods for structure determination are presented through spectroscopic and chromatographic techniques, highlighting their role in molecular identification and analysis. Conjugated systems and ultraviolet spectroscopy are discussed to link electronic structure with optical properties. The chemistry of benzene, aromaticity, and electrophilic aromatic substitution reactions is examined, including polyaromatic compounds. Finally, the course covers characteristic polar functional groups in organic materials, carbonyl compounds and their condensation reactions, anionic polymerization, and the chemistry of carboxylic acids, amines, and their derivatives.

[MSEN 202] – Fundamentals of Chemistry Laboratory

This laboratory course introduces students to fundamental experimental concepts in Physical, Inorganic and Organic Chemistry, with strong emphasis on laboratory safety and good experimental practice. Students begin by learning safety regulations, chemical hazards, and proper techniques for accurate measurement of mass and volume, as well as the expression and preparation of solutions with specified concentrations. The course then examines homogeneous and heterogeneous equilibria, including the effects of concentration and temperature, with particular focus on aqueous electrolyte systems. Key topics include the behavior of weak acids and bases, pH measurement, determination of pK values, preparation and evaluation of buffer solutions, and estimation of salt hydrolysis constants. Fundamental principles and techniques of volumetric analysis are covered, including acid–base, complexometric, and redox titrations. Students also study redox reactions, the reactivity series of elements, electrochemical cells, and electrolysis, along with their practical applications. In addition, the course introduces essential organic chemistry laboratory techniques such as distillation and liquid–liquid extraction for purification and separation of organic compounds. Physicochemical experiments involving surface tension, viscosity, refractive index, and temperature-dependent solubility are conducted, enabling students to link molecular interactions to macroscopic properties while developing skills in data analysis, uncertainty estimation, and experimental interpretation.

[MSEN 203] – Physics for Scientists and Engineers II – Electricity & Magnetism

COURSE CONTENT: This course introduces the fundamental laws governing electric and magnetic fields, how they interact with matter, and how they combine to produce electromagnetic waves. Students learn how charges create electric fields, how currents produce magnetic fields, how changing fields generate induction, and how Maxwell's equations unify all of classical electromagnetism. The course builds strong physical intuition supported by calculus and vector analysis.

[MSEN 204] – Mathematics II - Advanced Calculus

COURSE CONTENT: This course covers advanced calculus tools essential for analyzing and modeling materials engineering systems. Topics include higher-order derivatives, Taylor series, multivariable calculus, partial derivatives, optimization, multiple integrals, vector calculus, and key theorems such as Green's, Stokes', and Divergence Theorem. Students also study ordinary and partial differential equations, Laplace transforms, and basic numerical methods. Emphasis is placed on applications to heat transfer, diffusion, stress analysis, and other core materials engineering processes.

[MSEN 205] – Bonding, Crystallography, Crystal Defects
COURSE CONTENT: Fundamental crystallographic concepts; Structure of crystals: lattice, basis, translational symmetry; Connection between crystallographic theory and X-ray techniques; Introduction to X-ray diffraction (XRD); Bragg's law and structure factor; Interaction of X-rays with matter; Experimental Verification of Bragg's Law; Structure–property relationships; Crystal Defects: Point, Line and Planar defects; Impact of defects on the properties of materials.

[MSEN 301] – Physical Chemistry
COURSE CONTENT: This course introduces the essential principles of Physical Chemistry. Core topics include the thermodynamic properties of gases, liquids and solids; the First, Second and Third Laws of Thermodynamics; and chemical and phase equilibria in multicomponent systems. Students explore the properties of solutions and electrolytes, ionic activity, and introductory electrochemistry. Fundamental concepts of chemical kinetics, chemical reactions and catalysis are also covered, focusing on reaction rates, temperature effects and mechanisms.

[MSEN 302] – Organic Chemistry Laboratory
COURSE CONTENT: This laboratory course provides hands-on training in fundamental experimental techniques of organic chemistry relevant to materials science and engineering. Through a series of guided experiments, students gain practical experience in the synthesis, isolation, purification, and characterization of organic compounds used as material precursors. The laboratory begins with hydrolysis reactions and the isolation of benzoic acid using recrystallization, introducing essential purification methods. Students then perform esterification reactions and apply acid–base extraction techniques for compound separation. Photochemical synthesis experiments illustrate radical processes through the dimerization reaction leading to benzopinacol. Carbon–carbon bond formation is explored via aldol condensation reactions for the synthesis of conjugated enones, highlighting pathways to functional organic materials. Pericyclic reactions are introduced through cycloaddition reactions used in the synthesis of polyaromatic materials. Emphasis is placed on modern characterization techniques, including nuclear magnetic resonance (NMR) spectroscopy, for the analysis of organic precursors. Finally, students learn structure determination by combining spectroscopic methods with chromatographic techniques. The course strengthens experimental skills, reinforces reaction mechanisms taught in lectures, and develops the ability to analyze and interpret experimental data in the context of organic materials chemistry.

[MSEN 303] – Data Analysis - Statistics
COURSE CONTENT: This course introduces statistical methods and data analysis techniques essential for materials engineering. Topics include descriptive statistics, probability,

inferential statistics, correlation and regression, ANOVA, and statistical quality control. Emphasis is placed on applying these methods to analyze experimental data, predict material behavior, optimize processes, and support decision-making. Students also learn to use computational tools for data visualization, simulation, and statistical analysis.

[MSEN 304] – Thermodynamics

COURSE CONTENT: This course introduces the fundamental principles of thermodynamics with a strong focus on applications in Materials Science and Engineering. It begins with thermodynamic variables, state functions, and the first and second laws of thermodynamics, establishing the conceptual and mathematical framework of the subject. Key thermodynamic quantities such as entropy, enthalpy, and the Helmholtz and Gibbs free energies are examined, along with Maxwell relations and their physical interpretation. Special emphasis is placed on chemical potential, phase equilibrium, and the phase rule, including applications of the Clapeyron and Clausius–Clapeyron equations. The thermodynamics of solutions is explored through ideal and regular solution models, activities, and partial molar quantities. Binary phase diagrams and common invariant reactions, such as eutectic and peritectic transformations and miscibility gaps, are analyzed in detail. The course further addresses the thermodynamics of phase transformations and nucleation, highlighting driving force concepts relevant to materials processing and stability. Thermochemistry and chemical reactions in materials are discussed, including Ellingham-type analyses where appropriate. Finally, the course introduces essential concepts of statistical thermodynamics and provides an overview of computational thermodynamics, focusing on the CALPHAD methodology and the use of thermodynamic databases through demonstrations.

[MSEN 305] – Introduction to Solid Mechanics

COURSE CONTENT: This course provides the foundation of engineering analysis and introduces the fundamental principles governing force systems acting on bodies. It aims to develop a clear understanding of how structures and mechanical components respond to applied loads through systematic modeling and equilibrium analysis. A central focus of the course is the construction and interpretation of Free-Body Diagrams, which form the basis for translating physical systems into solvable engineering problems. Students learn to apply equilibrium equations to determine external reactions and internal force distributions within structural members. Emphasis is placed on the calculation of axial forces, shear forces, and bending moments, as well as on understanding how these internal actions vary along a structure. The course also introduces the geometric properties of cross-sections, including the determination of centroids and moments of inertia, and explains their significance in structural behavior. Through problem-solving and analytical reasoning, students develop essential skills and mechanical intuition required for advanced studies in mechanics, structural analysis, and engineering design.

[MSEN 401] – Inorganic materials chemistry

COURSE CONTENT: This course provides a comprehensive introduction to Inorganic Materials Chemistry, focusing on the structural, electronic, synthetic, and functional aspects of inorganic materials. It begins with a detailed description of crystal structures, including unit cells, symmetry, close-packed structures, and the role of interstitial sites.

The structures of metals, alloys, and ionic solids are examined, emphasizing lattice energetics, lattice enthalpy, Born–Haber cycles, and the influence of defects and non-stoichiometry on material properties. The course then introduces the electronic structures of inorganic solids, covering electrical conductivity, band theory, and semiconducting behavior. Key methods for the synthesis of inorganic materials, including high-temperature solid-state reactions and solution-based approaches, are presented alongside modern characterization techniques such as diffraction, spectroscopy, microscopy, magnetometry, and electrochemical analysis. Major classes of inorganic materials are explored, including metal oxides, nitrides, fluorides, sulfides, intercalation compounds, and framework structures such as zeolites used in heterogeneous catalysis. Additional topics include ion transport and solid electrolytes, hydrides for hydrogen storage, optical and semiconducting materials, molecular solids, and nanomaterials. Emphasis is placed on structure–property relationships and on understanding how composition, defects, and dimensionality govern the performance of advanced inorganic materials.

[MSEN 402] – Physical Chemistry Laboratory

COURSE CONTENT: The laboratory component introduces students to key experimental techniques for the characterization of the physical and chemical behavior of systems. Through a series of structured laboratory experiments, students become familiar with thermal analysis methods such as calorimetry, as well as the determination of boiling points and the study of mixing point distributions. Emphasis is placed on the measurement of electrolytic conductivity of solutions and on the investigation of acid–base properties through pH measurements and the determination of acid dissociation constants (pK values). The effect of temperature and ionic strength on reaction rates is systematically examined. The laboratory develops practical experimental skills, data analysis and interpretation abilities, and a deeper understanding of the factors governing physicochemical behavior in solution.

[MSEN 403] – Design and Analysis of Materials Experiments

COURSE CONTENT: This course bridges the gap between material characterization and statistical decision-making. Students will move beyond "trial-and-error" approaches, learning to systematically vary multiple processing parameters simultaneously. The curriculum focuses on identifying critical factors that influence material performance and optimizing processes to achieve superior material properties.

[MSEN 404] – Condensed Matter Physics

COURSE CONTENT: This course covers the physical principles underlying the structure and properties of solids, including crystal structures, lattice vibrations, electronic, thermal, optical, and magnetic properties. Students will learn characterization techniques such as X-ray diffraction, explore superconductivity and modern nanomaterials, and apply these concepts to understand and engineer material behavior in practical applications.

[MSEN 405] – Polymer Science and Engineering: Theory and Laboratory

COURSE CONTENT: This course provides a comprehensive introduction to Polymer Science and Engineering, covering the fundamental concepts that govern the synthesis, structure, properties, and processing of polymeric materials. It begins with the concept of the macromolecule, polymer classification and nomenclature, and the structure and dimensions of polymer chains. The course examines the main polymerization reactions, highlighting similarities and differences among free radical, controlled radical, ionic, and step-growth polymerization mechanisms, together with reaction kinetics, molecular weight development, and distribution. Typical commercial polymers, including polyolefins, vinyl polymers, polyesters, polyamides, polyurethanes, and resins, are discussed in relation to their structure and applications. Emphasis is placed on copolymerization, molecular weight averages, and experimental techniques for polymer characterization. The solid-state behavior of polymers, including crystallization kinetics and glass transition phenomena, is analyzed. The course further introduces polymer reaction and process engineering, focusing on viscoelasticity, non-Newtonian flow, rheology, and modeling of polymerization processes. Environmental aspects of polymers, such as recycling technologies, microplastics, and hazardous substances, are also addressed. Laboratory sessions complement the lectures through polymer synthesis and characterization experiments, reinforcing theoretical concepts with practical experience.

[MSEN 501] – Inorganic Materials Chemistry Laboratory

COURSE CONTENT: This laboratory course provides hands-on experience in the synthesis, processing, and characterization of advanced inorganic and functional materials. Through a series of structured experiments, students become familiar with key experimental approaches used in modern materials research and development. The course includes solid-state synthesis of crystalline materials such as spinel oxides, emphasizing phase formation, thermal treatment, and structural characterization. Solution-based methods are introduced through sol–gel synthesis of metal oxide nanoparticles, highlighting control over composition, particle size, and morphology. Students also prepare doped phosphor materials and investigate their photophysical properties, gaining insight into luminescence mechanisms. Solvothermal synthesis techniques are applied to the fabrication of metal–organic frameworks (MOFs), followed by characterization of their structure and properties. Functional device-oriented experiments include the fabrication and testing of a conducting oxide material and the assembly and performance evaluation of a dye-sensitized solar cell (DSSC). Throughout the course, students use a range of characterization techniques, such as diffraction, spectroscopy, and electrical measurements, to analyze structure–property relationships. The laboratory develops experimental skills, data interpretation abilities, and an understanding of how synthesis routes influence the performance of functional materials.

[MSEN 502] – Materials Characterization

COURSE CONTENT: The course *Materials Characterization* provides a comprehensive introduction to the fundamental principles and techniques used to investigate the structure, composition, and properties of materials. Students are introduced to different types of radiation, their energy–wavelength relationships, atomic theory, and electronic energy levels, followed by the interaction of radiation with matter, including elastic scattering and absorption phenomena. The course covers X-ray diffraction (XRD), including X-ray generation, detection, and basic crystallography concepts, emphasizing phase identification, crystallinity, and crystallite size determination. Surface and nearsurface analysis techniques such as X-ray Photoelectron Spectroscopy (XPS), Auger Electron Spectroscopy (AES), and Energy Dispersive X-ray Spectroscopy (EDS) are presented, highlighting their principles, instrumentation, and applications. Electron microscopy, including Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), is introduced, with attention to imaging, analytical capabilities, and integration with spectroscopic methods. Optical spectroscopic techniques, including UV–visible spectroscopy, Fourier Transform Infrared (FT-IR) spectroscopy, and Raman spectroscopy, are also examined, focusing on molecular and electronic transitions, instrumentation, and interpretation of spectra. Through lectures, practical examples, and case studies, students gain the knowledge and skills to select and apply appropriate characterization methods, interpret results critically, and evaluate structural and chemical information for various materials, preparing them for research and industrial applications.

[MSEN 503] – Ceramics

COURSE CONTENT: The course Ceramic Materials provides a comprehensive introduction to the science, technology, and applications of ceramics in materials science and industry. It begins with an overview of ceramics in various industrial and technological contexts and a discussion of raw materials and their properties. Students study the classification of ceramics into traditional and advanced categories and learn about processing and shaping techniques, including powder processing, sintering, and forming methods, as well as ceramic coatings. The course covers the atomic and crystalline structures of ceramics, as well as non-crystalline solids such as glasses, and introduces phase diagrams to understand phase equilibria and transformations. Key concepts of nucleation, crystal growth, devitrification, solid-state reactions, and non-equilibrium processing are addressed to explain microstructural development. Students explore the relationship between microstructure and a wide range of properties, including mechanical (strength, toughness), thermal (conductivity, expansion), optical (transparency, refractive index), electrical (dielectric, conductive behavior), and chemical stability (corrosion, oxidation). Emphasis is placed on understanding the interdependence of processing, structure, and properties, and on the critical evaluation of ceramics for engineering and technological applications. Through lectures, case studies, and practical examples, students develop the knowledge and skills necessary to select, design, and optimize ceramic materials for diverse applications.

[MSEN 504] – Chemical Process Engineering

COURSE CONTENT: This undergraduate course introduces the fundamental principles of process systems engineering with emphasis on mass and energy transport phenomena in engineering applications. The course begins with basic concepts and definitions, followed by the formulation and application of general mass and heat balances in macroscopic systems, which form the foundation for analyzing and designing chemical and biological processes. Students are then introduced to mass transfer at the microscopic scale, focusing on diffusion phenomena and the diffusion equation as a key mathematical model. Building on these fundamentals, the course explores selected applications of process systems engineering. Topics include heterogeneous reaction engineering, fixed-bed adsorption, and membrane technologies for gas separation processes. Core concepts of crystallization and filtration are also introduced, highlighting their importance in industrial separation and purification operations. In addition, the course examines fuel cell systems as an example of integrated energy conversion technologies. Finally, the course provides an introduction to biomedical applications, with particular emphasis on controlled drug release systems and their underlying transport mechanisms. Throughout the course, theoretical principles are linked to practical examples, enabling students to develop problem-solving skills and a solid understanding of how transport phenomena govern the performance of engineered systems.

[MSEN 505] – Mechanical Behavior of Engineering Materials

COURSE CONTENT: This course establishes the fundamental principles required to analyze the mechanical behavior of solid bodies under load. Bridging the gap between static equilibrium and structural design, students will explore the relationships between external loads, internal stresses, strains, and deformations. The course emphasizes the sizing and analysis of structural members—both statically determinate and indeterminate—subjected to various loading conditions, including tension, compression, bending, and torsion.

[MSEN 601] – Design of materials in the atomic scale

COURSE CONTENT: This course provides an in-depth introduction to atomic-scale materials science, focusing on how atomic and molecular structure governs the properties and performance of engineering materials. It begins with the fundamentals of atomic structure, bonding, crystal structures, and defects, emphasizing their role in determining mechanical, thermal, electronic, and optical behavior. Students explore structure–property relationships and how atomic arrangement translates into macroscopic material performance. The course introduces modern computational modeling and simulation techniques, including molecular dynamics, Monte Carlo methods, and the basic principles of density functional theory, as tools for predicting material behavior and guiding materials design. Emphasis is placed on using simulations to understand deformation, diffusion, phase stability, and functional responses at the atomic scale. Building on these foundations, the course examines materials design strategies that tailor atomic structure to achieve targeted properties, including the design of alloys, composites, and nanostructured materials. Case studies of engineered materials illustrate how atomic-scale insights inform real-world design decisions. The course concludes by linking atomic-scale modeling and design concepts to applications in materials engineering, such as advanced functional materials, nanoengineered devices, and industrially relevant material systems.

[MSEN 602] – Materials Characterization Laboratory

COURSE CONTENT: This course provides a comprehensive introduction to the experimental techniques used for the characterization of materials and the interpretation of structure–property relationships. Through a combination of lectures and hands-on laboratory sessions, students gain practical experience with modern characterization tools commonly used in materials science and engineering. Topics covered include crystallographic analysis using X-ray diffraction (XRD), microstructural characterization with optical microscopy and scanning electron microscopy (SEM), elemental analysis through energy-dispersive X-ray spectroscopy (EDS) and spectroscopy techniques (FT-IR and Raman). Additional experiments introduce thermal analysis techniques such as differential scanning calorimetry (DSC), as well as mechanical characterization methods including hardness testing and basic tensile testing. Emphasis is placed on proper sample preparation, experimental design, data acquisition, and quantitative data analysis. Students learn how to critically evaluate experimental results, identify sources of error, and relate observed material behavior to underlying atomic and microstructural features. By the end of the course, students will be able to select appropriate characterization techniques for different classes of materials, operate laboratory instrumentation safely and effectively, and communicate experimental findings clearly through written laboratory reports and oral presentations.

[MSEN 603] – Industrial Process Design and Economics

COURSE CONTENT: The course introduces students to the application of techno-economic feasibility studies in chemical process industries, with particular emphasis on materials processing industrial plants. It is based on a thorough feasibility study of a selected plant, which varies each year, and the preparation of a detailed report that constitutes an important part of the overall course grade. The course covers the development and interpretation of methodological flow diagrams and the application of mass and energy balances for process analysis. Students learn the preliminary sizing and selection of key process equipment, as well as methods for cost estimation, economic evaluation, and assessment of project profitability. To support this, the course includes an extensive lab component where students use specialized software tools for plant design and economic evaluation. The course also addresses throughput analysis, identification of bottlenecks, and strategies for process optimization. Additionally, students explore the optimization of operating conditions using techno-economic criteria and the principles of process scale-up. Finally, the course examines the determination and evaluation of processing parameters in outlet streams to ensure compliance with material quality standards and sustainable operation.

[MSEN 604] – Engineering Laboratory (mechanical testing, non-destructive testing)

COURSE CONTENT: This course provides a comprehensive introduction to experimental methods used for the mechanical characterization and non-destructive evaluation of engineering materials and components. The course integrates theoretical background with hands-on laboratory practice, enabling students to understand material behavior under different loading and service conditions. Laboratory experiments focus on mechanical testing techniques such as tensile, compression, bending, impact, fatigue, and hardness testing. Students investigate elastic and plastic deformation, fracture mechanisms, and failure modes in metals, polymers, ceramics, and composite materials. Data acquisition systems and standardized testing procedures (ASTM/ISO) are emphasized. In parallel, the course introduces fundamental non-destructive testing (NDT) methods used in industrial quality control and structural integrity assessment. Techniques include ultrasonic testing, radiographic inspection, magnetic particle testing, dye penetrant testing, and basic eddy current methods. Students learn the principles, capabilities, and limitations of each technique. Emphasis is placed on experimental planning, safe laboratory practice, data analysis, uncertainty evaluation, and technical reporting. Upon completion, students will be able to select appropriate mechanical and non-destructive testing methods, interpret experimental results, and assess material performance and structural reliability in engineering applications.

[MSEN 605] – Composite materials

COURSE CONTENT: This course provides a comprehensive introduction to the science and engineering of composite materials, emphasizing their structure, properties, processing, and applications. It begins with an overview of composites, including classification, advantages, and limitations of different material systems. Reinforcements such as particles, whiskers, continuous fibers, and textile architectures are discussed in relation to their influence on mechanical performance. The course covers polymer matrix composites, including common processing methods such as hand lay-up, resin transfer molding (RTM), and prepreg/autoclave techniques, as well as defect formation and quality assurance. Metal matrix and ceramic matrix composites are examined with respect to processing routes and high-temperature behavior. Fundamental micromechanics concepts are introduced, including stiffness prediction, load transfer, and laminate theory. Interfaces and interphases are explored, highlighting bonding, residual stresses, and environmental degradation. Failure mechanisms and damage in composites, such as matrix cracking, delamination, impact, and fatigue, are analyzed, along with an overview of non-destructive testing techniques. Case studies demonstrate the design and application of composites in aerospace, automotive, energy, and civil engineering. Finally, the course addresses sustainability and recycling challenges associated with composite materials, emphasizing environmental considerations in modern materials engineering.

[MSEN 701] – Materials selection in engineering design

COURSE CONTENT: This course provides a comprehensive introduction to the principles and practices of materials selection in engineering design, emphasizing how materials choices impact product performance, reliability, and sustainability. It begins by examining the role of materials in product development, including design requirements, functional constraints, and performance targets. Students learn to apply performance indices and Ashby-type methodologies for systematic screening, ranking, and selection of materials. The course covers the use of materials property charts, multi-objective selection, and trade-offs between competing properties. Considerations of materials and process compatibility are discussed, including joining techniques, surface engineering, and integration with manufacturing processes. Economic factors are introduced through cost modeling, sensitivity analysis, and evaluation of availability and supply risk. Degradation and reliability issues, such as corrosion, wear, and fatigue, are addressed alongside basic principles of failure analysis. Selection for functional requirements, including thermal, electrical, optical, and magnetic performance, is explored, along with sustainability and circularity metrics in material choice. Case studies using real components and databases reinforce the application of these concepts, equipping students with practical skills to make informed, balanced materials selection decisions in modern engineering design.

[MSEN 702] – Materials Processing

COURSE CONTENT: This course provides a comprehensive introduction to the fundamental principles of materials processing and manufacturing. Topics include solidification, phase transformations, and microstructural evolution during processing, as well as processing methods for metals, polymers, ceramics, and composite materials. The influence of processing routes on mechanical, thermal, and functional properties is examined, with emphasis on process selection, defect formation, and performance optimization in engineering applications.

[MSEN 801] – CAD-CAE in materials

COURSE CONTENT: This course bridges the gap between material science theory and computational mechanics, introducing students to the practical application of the Finite Element Method (FEM) in engineering design. Moving beyond simple geometric modeling, students will learn to translate physical problems into accurate Computer-Aided Engineering (CAE) models. The curriculum emphasizes the theoretical foundations and inherent limitations of numerical simulation.

[MSEN 802] – Deformation and Failure of Engineering Materials

COURSE CONTENT: This course provides an insight into the mechanical response of engineering materials, with a primary focus on cyclic loading and fatigue failure, while foundational topics in plastic deformation and static fracture are covered. The course bridges theory and application, equipping students with the analytical tools to predict component life. Emphasis is placed on modern approaches to fatigue design, including fracture mechanics and strain-based methods used in the automotive and aerospace industries.

[MSEN 901] – Computational Methods in Engineering Design

COURSE CONTENT: This course provides a comprehensive framework for applying computational software and techniques to the engineering design process. Shifting beyond basic stress analysis, students will learn to utilize commercial simulation software as a primary tool for design synthesis and optimization.

[MSEN 902] – Materials and Environment

COURSE CONTENT: The course *Materials and Environment* introduces students to the fundamental principles of environmental engineering and the interactions between materials and the environment. It begins with an overview of environmental pollution, including the generation, transport, and fate of pollutants in air, water, and soil, and discusses applied technologies for pollution control and environmental protection. Students study the role of materials in pollution mitigation, focusing on their physicochemical and structural properties, surface interactions, and key processes in anti-pollution technologies. Specific topics include catalysis and catalytic materials, heterogeneous photocatalysis and photocatalytic materials, adsorption and adsorbent materials, molecular imprinting for pollutant removal, and the management of special solid wastes. The course also examines polymers, including their properties, environmental behavior, ecological impacts, and waste management strategies, as well as biodegradable polymers and their applications. Asbestos, cement, and concrete are discussed regarding their properties, environmental impacts, toxicity, and life-cycle considerations. Emphasis is placed on life-cycle assessment (LCA) of materials to evaluate sustainability and environmental performance. Through lectures, case studies, and practical examples, students gain the knowledge and skills necessary to understand, evaluate, and apply materials-based strategies for environmental protection and sustainable engineering.

[MSEN 903] – Research Methodology

COURSE CONTENT: This course provides a comprehensive introduction to the principles of scientific research and methodology as applied to Materials Science and Engineering. It covers the scientific method and hypothesis-driven research, the formulation of research questions and objectives, and the main research designs used in the field, including both experimental and computational approaches. Emphasis is placed on effective strategies for literature searching, critical reading and evaluation of scientific publications, as well as proper reference management and the use of international citation styles. The course also addresses research planning and organization, including the definition of milestones, the use of Gantt charts, risk assessment, and safety considerations in laboratory environments. Furthermore, topics related to research data management are discussed, such as maintaining laboratory notebooks and applying FAIR data principles. Students are introduced to basic statistical concepts, uncertainty analysis, and error propagation. The course concludes with key aspects of research integrity, including plagiarism avoidance, authorship, peer review, research ethics, open science, and reproducibility. Students also gain practical skills in preparing research proposals and effectively communicating scientific results through written and oral presentations.

[MSEN 904] – Diploma Thesis I

COURSE CONTENT: Topic definition and proposal; literature review; methodology selection; experimental/computational execution; data analysis and validation; drafting of thesis; final revisions; presentation and oral defense.

The exact content is tailored to the chosen thesis topic and may involve laboratory work, simulations, materials design, processing, characterization, performance evaluation, sustainability analysis, or industrial case studies.

[MSEN 1001] – Smart Materials and Systems

COURSE CONTENT: This course provides a comprehensive introduction to the principles, behavior, and applications of smart materials and adaptive systems. Topics include shape memory alloys, piezoelectric and magnetostrictive materials, electroactive polymers, and stimuli-responsive composites. Students explore the mechanisms that enable materials to sense, respond, and adapt to environmental changes, and examine how these materials are integrated into devices and systems for actuation, sensing, and energy harvesting. Applications in robotics, aerospace, biomedical devices, and structural health monitoring are emphasized throughout.

[MSEN 1002] – AI and Machine learning in materials science and engineering

COURSE CONTENT: This course introduces the principles and applications of artificial intelligence (AI) and machine learning (ML) in materials science and engineering. Students begin with a review of mathematical foundations, including linear algebra, calculus, and differential equations, which underpin AI/ML techniques. Supervised learning methods such as regression, classification, decision trees, and random forests are explored, along with neural networks, covering fundamentals, backpropagation, and deep learning architectures. Unsupervised learning techniques, including clustering and dimensionality reduction methods like PCA and t-SNE, are discussed, as well as the basics of reinforcement learning and its potential applications in materials design. Model evaluation concepts, including performance metrics, cross-validation, and overfitting/underfitting, are emphasized. Practical applications highlight energy-related and materials-focused case studies, such as battery materials (lithium-ion and solid-state), catalysts for sustainable energy, polymer design and recycling pathways, and defect engineering in crystallography. Integration of ML with molecular simulations, including molecular dynamics and density functional theory (DFT) data, is demonstrated. Ethical and practical considerations in AI-driven materials discovery are discussed. The course culminates in student-led projects, where participants apply AI/ML techniques to real-world materials problems, analyze data, and present their findings, bridging theoretical knowledge with hands-on computational materials engineering practice.

[MSEN 1003] – Seminars (soft skills, entrepreneurship & innovation, IP rights, patents, startups)

COURSE CONTENT: Soft skills: communication, technical writing, presentations, teamwork, leadership, negotiation, conflict management, project management. Entrepreneurship & innovation: ideation, customer discovery, value proposition, business model basics, go-to-market, funding landscape. IP and patents: types of IP, patentability criteria, prior-art search, patent drafting overview, freedom-to-operate basics, licensing. Startups and innovation ecosystem: incubators/accelerators, spin-offs, regulatory basics (where relevant), case studies from materials/medtech/energy domains, guest speakers from industry and technology transfer offices.

[MSEN 1004] – Diploma Thesis II

COURSE CONTENT: Topic definition and proposal; literature review; methodology selection; experimental/computational execution; data analysis and validation; drafting of thesis; final revisions; presentation and oral defense.
The exact content is tailored to the chosen thesis topic and may involve laboratory work, simulations, materials design, processing, characterization, performance evaluation, sustainability analysis, or industrial case studies.

B. ELECTIVE COURSES

[MSEN 711] – Fundamentals of Additive Manufacturing

COURSE CONTENT: This course provides a comprehensive introduction to additive manufacturing (AM), exploring its principles, technologies, and applications across polymers, metals, ceramics, and composites. Students learn the opportunities and limitations of AM and its adoption in industrial settings. The course covers polymer AM methods, including material extrusion, vat photopolymerization, and powder bed fusion, as well as metal AM processes such as laser and electron-beam powder bed fusion and directed energy deposition, including feedstocks and machinery. Emerging topics such as ceramic and composite AM, multi-material printing, and design for additive manufacturing (DfAM) are introduced, with an overview of topology optimization, lattice structures, and support strategies. Emphasis is placed on the relationships between process, structure, and properties, including thermal histories, anisotropy, microstructure, and residual stresses. Students also study quality assurance, including in-situ monitoring, inspection, mechanical testing, and standards. Post-processing techniques such as stress relief, heat treatment, hot isostatic pressing, machining, and surface finishing are discussed. The course concludes with economic and sustainability considerations, reinforced by case studies and a team project. By the end, students gain the knowledge and skills to design, analyze, and evaluate AM processes and materials for engineering applications.

[MSEN 712] – Powder metallurgy

COURSE CONTENT: This course provides a comprehensive introduction to powder metallurgy (PM), focusing on the principles, processes, and applications of powder-based materials in engineering. It begins with an overview of PM applications, including structural components, filters, magnetic materials, and hardmetals. Students learn powder production methods such as atomization, reduction, electrolysis, and mechanical milling, along with approaches for powder recycling. The course covers powder characterization, including particle size and shape distributions, surface area, flowability, and apparent and tap densities. Compaction and shaping techniques are explored, including uniaxial pressing, cold isostatic pressing (CIP), and powder injection molding, with a discussion of binders and lubricants. Fundamental sintering concepts are presented, including diffusion mechanisms, neck growth, densification, grain growth, and liquid-phase sintering. Post-processing techniques such as sizing, heat treatment, infiltration, and surface treatments are also addressed. Advanced full-density processes, including hot isostatic pressing (HIP), hot pressing, and forging or rolling of PM preforms, are linked to additive manufacturing (powder bed fusion). Students examine defect formation, quality assurance, standards, and safety considerations. The course concludes with design principles for powder metallurgy and practical case studies, equipping students with the knowledge to optimize PM processes and materials for industrial applications.

[MSEN 713] – Materials Circular Economy and LCA

COURSE CONTENT: This course provides a comprehensive introduction to sustainability and circular economy principles in materials engineering, focusing on the environmental, economic, and social aspects of material use throughout the product life cycle. It begins with an overview of materials and sustainability, including resource consumption, emissions, and circularity metrics. Students explore circular economy strategies, emphasizing design for reuse, repair, remanufacture, and recycling (the "R" strategies). Life cycle thinking is introduced to analyze product systems, functional units, system boundaries, and allocation methods. The course covers life cycle inventory (LCI), including data collection from primary and secondary sources and assessment of data quality, and life cycle impact assessment (LCIA), examining major impact categories, interpretation, and limitations. Life cycle costing (LCC) and social LCA are discussed to provide a broader sustainability perspective. Circularity indicators and their integration with LCA are highlighted, along with design-integrated approaches to support sustainable materials selection and product development. Case studies address metals, polymers, batteries and critical materials, composites, and end-of-life scenarios. Practical software and laboratory sessions enable students to perform simplified LCA modeling, compare scenarios, and develop an applied understanding of circularity and sustainability in materials engineering.

[MSEN 721] – Surfaces and Interfaces and Thin- Film Materials Science

COURSE CONTENT: The course covers fundamental concepts of surfaces, interfaces, and thin-film materials, including surface energy, adsorption, wetting, and interfacial phenomena. Students will study thin-film growth mechanisms, deposition techniques, and characterization methods, and explore how surfaces and interfaces influence mechanical, thermal, optical, and electronic properties. Applications in coatings, microelectronics, and nanostructured materials are emphasized throughout.

[MSEN 722] – Nanomaterials and Nanotechnologies

COURSE CONTENT: This course provides a comprehensive introduction to the science, properties, and applications of nanomaterials. Topics include the synthesis, structure, and characterization of nanoparticles, nanowires, nanotubes, and thin nanostructured films. Students explore size-dependent physical, chemical, mechanical, and electronic properties, as well as the principles underlying quantum effects at the nanoscale. The course also covers fabrication techniques, self-assembly, and integration of nanomaterials into functional devices and systems. Applications in electronics, energy storage and conversion, catalysis, biomedical devices, and advanced coatings are emphasized throughout.

[MSEN 723] – Fundamentals of Semiconductor Materials

COURSE CONTENT: This course covers the structure, electronic properties, defects, and doping of semiconductor materials. Students will learn about charge carriers, band theory, transport phenomena, and characterization techniques, and explore applications in electronic and optoelectronic devices such as diodes, transistors, LEDs, and solar cells. Emphasis is placed on linking atomic- and micro-scale material behavior to device performance.

[MSEN 731] – Bio- organic materials

COURSE CONTENT: This course provides a comprehensive introduction to bioorganic materials, emphasizing the intersection of organic chemistry, biology, and materials science. Students explore the structure, properties, and applications of biomaterials derived from biological building blocks, including peptides and proteins, nucleic acids such as DNA, polysaccharides, and lipids and their derivatives. The course covers organic synthesis strategies for creating functional biomaterials and probes, enabling targeted applications in diagnostics, biosensing, and drug delivery systems. Emphasis is placed on understanding how molecular design influences biological function and material performance, including biocompatibility, stability, and responsiveness. Sustainable and biodegradable materials are also addressed, highlighting their role in environmentally conscious design and biomedical applications. Through case studies and practical examples, students learn how to integrate bioorganic materials into functional devices and therapeutic systems. By the end of the course, students gain the knowledge and skills to design, synthesize, and apply bioorganic materials for cutting-edge applications at the interface of chemistry, biology, and materials engineering.

[MSEN 732] – Biochemistry Theory and Laboratory

COURSE CONTENT: This course provides a thorough introduction to biochemistry, covering fundamental concepts of water, amino acids, proteins, enzymes, and nucleic acids, along with their biological roles and applications. Students study the physical properties of water, hydrogen bonding, pH, and the suitability of aqueous environments for life. Amino acids are examined as building blocks of proteins, exploring their stereochemistry, acid–base properties, common and rare types, and chemical reactivity. Protein structure and function are emphasized, including primary, secondary, tertiary, and quaternary structures, denaturation, and the relationship between structure and biological activity. Enzyme theory is covered in depth, including classification, kinetics, cofactors, inhibition, substrate specificity, and regulation, as well as isoenzymes. Nucleic acids are studied from primary to secondary structure, with focus on DNA and RNA properties, nucleotide biosynthesis and catabolism, recombinant DNA, replication, transcription, and repair. Protein synthesis, covalent modifications, and subcellular localization are also addressed, alongside cellular defense mechanisms and recombinant DNA technology. The laboratory component provides hands-on experience in quantitative protein analysis, purification, electrophoresis, enzyme kinetics, PCR, DNA isolation, restriction digestion, ligation, and bacterial transformation, reinforcing theoretical concepts and developing practical molecular biology skills for research and biotechnology applications.

[MSEN 733] – Bio inorganic materials for biomedical and clinical applications

COURSE CONTENT: This course provides an in-depth introduction to bioinorganic chemistry, focusing on the roles of metals and inorganic compounds in biological systems and their applications in medicine and materials science. Students explore metalloproteins and their biological functions, examining how metal ions contribute to enzymatic activity, electron transfer, and structural stability. The course covers metal-based drugs and their mechanisms of action, along with the properties of inorganic materials at the nanoscale. Emphasis is placed on inorganic-based nanomedicine and nanopharmaceuticals, including the design and functionalization of nanoarchitectures for targeted therapeutic and diagnostic applications. Topics include magnetic nanoparticles for therapy and diagnosis, such as drug delivery carriers, hyperthermia agents, magnetomechanical induction systems, and contrast agents in MRI and PET imaging. Additional applications of inorganic nanoparticles, including antimicrobial activity and photodynamic therapy, are discussed. Through case studies and practical examples, students gain insight into the chemical modifications that enable specific functionality, biocompatibility, and responsiveness in complex biological environments. By the end of the course, students acquire the knowledge and skills to understand, design, and apply inorganic-based materials and nanostructures for advanced biomedical applications.

[MSEN 811] – Solidification, Casting and Welding

COURSE CONTENT: This course provides a comprehensive introduction to the fundamentals of solidification and welding processes, with an emphasis on microstructure development, defect formation, and materials reliability. Students study the principles of solidification, including nucleation, growth, thermal gradients, and cooling rates, as well as the effects of segregation, constitutional supercooling, and dendritic structures on grain refinement. Casting processes such as sand casting, investment casting, die casting, and continuous casting are examined, alongside gating and risering concepts. The course addresses common solidification defects, including porosity, shrinkage, and hot tearing, and strategies for defect prevention. Microstructure control through alloying, inoculation, and heat treatment is introduced, providing insight into material performance optimization. Welding fundamentals are covered, including energy sources, key processes (arc, resistance, laser), and weld metallurgy, with a focus on fusion zones, heat-affected zones, solidification cracking, and phase transformations. Residual stresses, distortion, and welding defects are discussed, along with inspection and quality assurance practices. Case studies link processing parameters to component failures and reliability, equipping students with the knowledge to predict, analyze, and control microstructural evolution and defects in metal manufacturing and joining processes.

[MSEN 812] – Waste Valorization and Advanced Recycling Technologies

COURSE CONTENT: This course provides a comprehensive overview of waste valorization and recycling strategies, emphasizing the recovery of secondary raw materials and their integration into circular economy approaches. Students explore the definitions and characteristics of waste streams, including quality and contamination challenges, and study mechanical recycling techniques such as sorting, size reduction, and separation methods, as well as the limitations of polymer reprocessing. Thermal and chemical recycling routes, including depolymerization and solvent-based processes, are introduced, alongside metals recycling through collection, shredding, and basic pyrometallurgical and hydrometallurgical methods. The course also addresses e-waste and battery recycling, highlighting concepts for recovering critical materials, as well as construction, demolition, glass, and ceramics waste streams. Pathways for transforming waste into materials, including upcycling, composites, fillers, and links to circular product design, are examined. Emphasis is placed on techno-economic and environmental assessment, integrating life cycle assessment (LCA) principles. Through case studies and a team project, students apply theoretical knowledge to practical waste valorization challenges, developing strategies to optimize material recovery, sustainability, and economic feasibility. By the end of the course, students gain a holistic understanding of recycling processes and the design of circular material flows.

[MSEN 813] – Critical raw materials

COURSE CONTENT: This course provides an in-depth exploration of critical raw materials (CRMs), emphasizing their strategic importance, supply risks, and sustainable management in modern industries. Students study the concepts of criticality, assessment frameworks, key indicators, and data sources, gaining an understanding of how materials are evaluated for economic, technological, and geopolitical relevance. The course examines the full value chain of raw materials, from mining, beneficiation, and refining to materials production, manufacturing, usage, and end-of-life. Drivers of demand and technology dependencies are analyzed, with particular focus on batteries, magnets, photovoltaics, catalysts, and semiconductors. Supply concentration, geopolitical considerations, trade, and resilience strategies are discussed alongside environmental and social impacts of extraction and processing. Students learn substitution and material efficiency strategies, including design approaches to reduce criticality, as well as recycling, urban mining, and the constraints of secondary supply. Policy and regulatory frameworks, including EU critical raw materials concepts and global perspectives, are reviewed. Case studies and student-led briefs on selected critical materials allow practical application of concepts, equipping students with the knowledge to assess risks, optimize resource use, and contribute to sustainable material strategies in industrial and technological contexts.

[MSEN 821] – Optoelectronic and Sensors: Materials and Applications

COURSE CONTENT: This course provides a comprehensive introduction to the materials, principles, and applications of optoelectronic devices and sensors. Topics include semiconductors, photonic materials, light–matter interactions, and the design and operation of photodetectors, light-emitting devices, and optical sensors. Students explore the mechanisms of signal transduction, sensitivity, and selectivity, as well as methods for material characterization and device fabrication. Emphasis is placed on applications in communications, imaging, environmental monitoring, healthcare, and wearable technologies, highlighting how material properties influence device performance and functionality.

[MSEN 822] – Materials and systems in Energy Technologies

COURSE CONTENT: This course introduces materials-oriented principles underlying energy technologies, with emphasis on how material properties, interfaces and architectures govern the performance of functional devices and engineered systems. Building on concepts from electrochemical and materials science, students examine the role of electrodes, electrolytes, interfaces and composite structures in representative energy technologies such as batteries, electrochemical capacitors and fuel cells. The course highlights structure-property-performance relationships, materials selection criteria, transport phenomena and degradation mechanisms relevant to materials used in energy-related applications. Attention is given to how processing routes, microstructure and interfacial design influence efficiency, durability and reliability at the device and subsystem level. Laboratory demonstrations focus on materials characterization and performance assessment within energy-related systems, including electrochemical response, stability metrics and diagnostic analysis. By the end of the course, students will understand how materials science principles enable the design, optimization and integration of materials into complex energy technologies.

[MSEN 823] – Electronic Materials Processing

COURSE CONTENT: This course introduces the principles and techniques used to process materials for electronic applications. It covers the properties of semiconductors, conductors, insulators, and other functional materials, linking their structure and composition to performance in devices. Students learn about crystal growth, thin-film deposition, doping, diffusion, lithography, etching, and packaging processes. The course also emphasizes characterization techniques to evaluate structural, electrical, optical, and surface properties. Practical laboratory sessions develop skills in material fabrication, testing, and analysis. By the end, students will be able to select appropriate materials and processing methods, analyze defects, and understand their impact on electronic device functionality.

[MSEN 831] – Bio- inspired Engineering

COURSE CONTENT: Nature-inspired methodology is introduced as a powerful approach to guide the design of new processes for applications ranging from energy and energy efficiency to chemical production and therapeutics, etc. The module will illustrate and empower the students to apply fundamental engineering principles, underpinning desirable properties observed in nature, to achieve higher performance (efficiency, scalability, robustness, etc.) and come up with innovative approaches in interdisciplinary teams to solve challenging problems by taking guidance from natural systems that are ideally structured to achieve this high performance.

[MSEN 832] – Biomechanics

COURSE CONTENT: This course provides a comprehensive introduction to biomechanics, exploring the mechanical behavior of biological tissues and their relevance to medical devices and implants. Students examine biomechanics across multiple scales, learning about loading conditions and modeling approaches. Fundamental concepts of stress, strain, constitutive models, anisotropy, and incompressibility are reviewed, forming the basis for understanding tissue mechanics. The mechanical behavior of biological tissues is covered, including viscoelasticity and poroelasticity, with emphasis on bone biomechanics, its structure, remodeling, fracture, and fatigue concepts. Soft tissue biomechanics is addressed, focusing on tendons, ligaments, cartilage, and basic muscle mechanics. The course introduces cellular mechanobiology, including adhesion, cytoskeletal mechanics, and mechanotransduction processes. Students explore the application of biomechanics in medical devices and implants, considering materials selection and design principles. Experimental methods are presented, including mechanical testing of tissues, imaging techniques, and digital image correlation. Case studies and problem sets provide practical applications, helping students link theoretical concepts to real-world scenarios. By the end of the course, students will understand tissue mechanics, design considerations for biomedical applications, and fundamental experimental approaches in biomechanics.

[MSEN 833] – Structural Biochemistry and Bioinformatics

COURSE CONTENT: This course provides a comprehensive introduction to structural and computational biology, focusing on the molecular architecture and dynamics of biomolecules. Students examine the levels of protein structure—primary, secondary, tertiary, and quaternary—and the non-covalent interactions, such as hydrogen bonding, hydrophobic effects, and electrostatics, that govern folding and stability. The structure and dynamics of nucleic acids, including DNA, RNA, and hybrid forms, are explored alongside lipid membranes and supramolecular assemblies. Advanced experimental techniques for structural analysis, such as NMR spectroscopy, cryo-electron microscopy, single-particle analysis, and mass spectrometry, are introduced, emphasizing the integration of data into protein modeling. The course also covers bioinformatics, including biological databases (UniProt, PDB, GenBank), sequence alignment methods (BLAST, FASTA, multiple sequence alignment), genome annotation, and functional prediction. Structural bioinformatics is explored through protein structure prediction approaches, including homology modeling, threading, and ab initio methods, as well as molecular visualization and analysis of structure–function relationships, active sites, and ligand binding. Computational tools and algorithms, such as molecular dynamics simulations, docking methods for protein–ligand and protein–protein interactions, and machine learning applications like AlphaFold, provide students with practical skills to analyze, predict, and model biomolecular structures in modern research.

Teaching – Assessment of Knowledge – Student Evaluation

The JEUPS is taught in person, with the physical presence of Lecturers and students in the classrooms. By decision of the Steering Committee, a weekly online teaching slot may be established, common to all students of the JEUPS, which will be used for tutorials and/or seminar classes and, exceptionally, for the make-up of classes in cases where classrooms are unavailable on other days of the week. In exceptional circumstances that do not allow in-person teaching, online lectures may be conducted for a limited period of time, upon a specifically justified decision by the Program Director, to address the urgent situation that necessitates temporary transition to online education.

Similarly, examinations are conducted with the physical presence of students and examiners in the Faculty's rooms, whether they are held in writing or orally. Exceptionally, only oral examinations may be conducted remotely, provided that the identification of the examinees is ensured and best practices for conducting online oral examinations are followed to ensure their integrity. Conducting written examinations remotely is not permitted, except in cases and under conditions mandatorily provided for by the current legislation. By decision of the Steering Committee, written examinations using tablets, laptops, or PCs are allowed, provided they are conducted with physical presence and supervision of the examinees in the Faculty's rooms, under the guarantees of a comprehensive plan for conducting such examinations that ensures their integrity and the equal treatment of the examinees.

Attendance of courses, tutorials, and any other organized educational activity of the Joint Undergraduate Program of Studies in English is mandatory. Students may be absent for up to thirty percent (30%) of the total teaching hours of each course per semester, while deviations from this limit are allowed only in exceptional cases, following approval by the Steering Committee. Regular participation in lectures, tutorials, and examinations is considered an essential element of academicity for the successful progress of students in the Program.

Before the start of each semester, the Secretariat of the JEUPS compiles and publishes the detailed semester timetable, taking care so that, as far as possible, Mandatory Courses and elective courses (a) are distributed equally across all days of the week, (b) there is no long time gap between courses on the same day they are taught, and (c) they do not coincide with the teaching of other M or K courses of the same semester of study.

Upon completion of the tenth (10th) week of teaching each semester, students are invited to participate in an anonymous electronic evaluation of the courses taught to them, as well as of the Lecturers, for the purpose of improving the level of their studies.

Student Evaluation

1. Students of the JEUPS of the Faculty are evaluated through written or oral examinations held at the end of the semester for courses taught during that semester, and by co-evaluating any other assignment or midterm examination and grade weighting, as defined in the description file of each course. All courses are examined during the repeat examination period of September. A

student's participation in an oral examination excludes their participation in the written examinations of the same course during the same examination period.

2. The Lecturer must provide one (1) grade at the end of each examination period, in which the following are co-evaluated: the student's performance during the teaching of the course (continuous assessment grade) and the student's performance during the final test of the course, written or oral (final examination grade). The final grade will result from the combination of the individual scores at a percentage to be determined by the Lecturer.
3. Lecturers take special care for the oral examination of students with dyslexia proven before their admission to the Program, or with serious mobility problems or vision problems that substantially hinder their participation in written examinations, according to the procedure defined in the current provisions.
4. The Secretariat of the Program publishes the detailed schedule of written examinations for each upcoming examination period in a timely manner. Under the responsibility of the Lecturers, assisted by the Secretariat of the JEUPS, an adequate number of proctors from doctoral candidates and postgraduate students is ensured. Lecturers must be constantly present in the examination areas, exercise supervision for their smooth and untainted conduct, and take the necessary measures for these purposes.
5. Every examinee must check, before attending a specific examination, that their name is included in the computer list of the Secretariat for those entitled to participate in the examination of the specific course. Examinees are prohibited from copying or falsifying the result of the examination process in any other way, and from bringing books, aids, notes, or electronic means of communication into the examination rooms. Any attempt to use electronic means of communication during the examination process constitutes a particularly aggravating case against the examinee. Furthermore, examinees are prohibited from using a separate sheet as scrap paper. For this purpose, they are allowed to use the last page of their exam paper. In case of violation of these terms, the paper is nullified as a measure of internal order to ensure the integrity of the examination process, without prejudice to any other penalty that may be imposed under the current provisions.
6. The designated proctors must check the academic ID that proves student status and certifies the identity of the examinee, verify that the student's full name and registration number (AEM) are written on their paper, initial every paper, supervise the examinees so they do not copy or talk to each other, constantly monitor the entrances and exits of the room—especially during the end of the examination time and the submission of papers—and ensure that no examinee leaves the examination room before thirty minutes (30') have passed since the distribution of the topics.
7. The written examination for each course lasts for a maximum of two (2) hours for all courses.
8. After the submission of the papers, the proctors count the papers received and one of them certifies the number of papers received. Subsequently, the papers are handed over to the Lecturer, who counts them and certifies with their signature in the presence of the proctor the number of papers received.
9. Lecturers must submit the results of the final examinations, written and/or oral, to the Secretariat of the Program collectively in the same grade sheet for each course, at the latest within twenty-five (25) days from the day of each

examination. In oral examinations, the Lecturer is not allowed to announce the result of the examination to the examined students individually, but only collectively for all those examined, in writing and/or orally, at the end.

10. In all courses of the JEUPS, the result of the student's knowledge assessment is expressed numerically with grades from zero (0) to ten (10). In the grade sheets, failure is marked with grades from zero (0) to four (4) and success with grades from five (5) to ten (10).
11. The publication of examination results with the full names of the examinees visible is not permitted in any way, but only by listing their registration number (AEM).
12. Carrying over a student's grade from one examination period to the next is not permitted. Clauses that may be written on the examinees' papers regarding their desire to fail if evaluated with a grade lower than desired, or references regarding how many courses one owes to graduate, are not allowed and, if written, are not taken into account.
13. The answers to the topics of the written examinations, practical and theoretical, are discussed after the issuance of results by the Lecturers with the interested students during specifically designated hours; those examined have the right to see their paper—of the respective current examination period—and request explanations for the way it was evaluated. Lecturers are obliged to post the proposed solutions for the practical exercises they included in the examinations on the course's e-learning site.
14. For the calculation of the degree grade for the 5-year cycle of studies and the composition of the courses listed therein, the following are counted: the forty (40) Mandatory Courses necessary for the accumulation of two hundred and thirty-four (234) credits (ECTS) from Mandatory (M) courses, the six (6) Elective (E) courses required for the accumulation of thirty-six (36) credits (ECTS), and the diploma thesis carried out over two semesters from which they will accumulate thirty (30) credits (ECTS)—three hundred (300) credits (ECTS) in total. Correspondingly, for the calculation of the degree grade for the 4-year cycle of studies and the composition of the courses listed therein, the following are counted: the thirty-four (34) Mandatory Courses necessary for the accumulation of two hundred and four (204) credits (ECTS) from Mandatory (M) courses, the four (4) Elective (E) courses required for the accumulation of twenty-four (24) credits (ECTS), and the diploma thesis from which they will accumulate twelve (12) credits (ECTS)—two hundred and forty (240) credits (ECTS) in total.

Article 9
Scholarships

Within the framework of the **Joint Undergraduate Program of Studies in English**, the possibility of granting scholarships to students is provided, based on academic and objective criteria and following a decision by the **Steering Committee**. Indicatively:

- The possibility is provided to grant up to three (3) scholarships per academic year to students who distinguish themselves during the selection process, based on the overall evaluation of their qualifications (including the results of the oral interview), and who ranked among the top admitted students of the cycle. These scholarships consist of a full exemption from the payment of tuition fees for the first academic year.

- An excellence scholarship with an exemption from the payment of fifty percent (50%) of the tuition fees for the following academic year may be awarded to the student who achieves the highest grade point average in all courses of each year, provided they have successfully completed all courses within the prescribed time. In the event of a tie, the scholarship may be awarded to more than one student.
- The **Steering Committee** may award excellence prizes to students who demonstrate exceptional performance during their studies. The prizes may be accompanied by an honorary distinction and/or a monetary award. Specifically, at the end of each academic year, a prize for the top student of the year may be awarded, based on overall performance in all courses and consistency in attendance. Correspondingly, an outstanding graduate prize may be awarded to the student with the highest academic performance during the cycle of studies.
- Provision may be made, following a reasoned decision by the **Steering Committee**, for full or partial exemption from the payment of tuition fees for students coming from war zones or being under a status of international or subsidiary protection, based on documented social and humanitarian criteria.
- In exceptional cases, a scholarship of a social nature may be granted to candidates or students of the Program facing serious financial difficulties, health issues, loss of a parent, or living under emergency conditions or long-term crisis, following an examination of a relevant application and supporting documents by the **Steering Committee**.
- The possibility is also provided for granting reciprocal scholarships, which consist of an exemption from the payment of part of the tuition fees, with the student's obligation to offer specific work in support of the Program. This work may include assistance in the library, support for administrative functions, assistance in research projects, or other activities to be determined by the **Steering Committee**, in consultation with the **Secretariat** and the **TRS** members. The duration and content of the reciprocal scholarship are clearly defined upon its award, while failure to meet the obligations may lead to its revocation.

The awarding of the aforementioned scholarships and/or excellence prizes, the specific terms of granting, and the obligations and rights of the scholars are determined following a decision by the **Steering Committee** and rest within its exclusive discretion, based on the financial capabilities of the Program and its cash reserves.

Article 10
Tuition Fees

The total tuition fees for enrollment in the Joint Undergraduate Program of Studies in English amount to forty thousand euros (€40,000), corresponding to eight thousand euros (€8,000) per academic year. The amount of tuition fees is determined and may be amended by decision of the Senate of AUTH, while the method and timing of payment can be adjusted by decision of the Steering Committee.

Tuition fees are paid by the students themselves (or by a third party, natural or legal person, on their behalf) into a designated bank account of the AUTH Special Account for Research Funds (ELKE), in ten (10) equal installments of four thousand euros (€4,000) each. The first installment is due at the time of registration in the Program, and the subsequent installments are due before the start of each semester. After each payment, a corresponding receipt is issued and the student is notified electronically.

Upon submission of the application, candidates are required to deposit a non-refundable application processing fee of one hundred fifty euros (€150). The application is not considered complete and will not be forwarded for evaluation if the corresponding amount has not been paid and proof of payment has not been submitted by the applicant. Payment is made electronically according to the instructions provided upon confirmation of application receipt. The fee is deposited into the ELKE AUTH account and is non-refundable in case of non- acceptance or withdrawal of the application.

In case of acceptance into the Program, candidates are required to pay an additional non-refundable tuition deposit of one thousand euros (€1,000). This amount is also deposited into the ELKE AUTH account and is non-refundable in case of withdrawal from the Program.

Article 12
Administrative Support - Facilities and Infrastructure

The **International Student Support Unit** is responsible for supporting the foreign students of the JEUPS, pursuant to Article 212 of Law 4957/2022. The mission of the International Student Support Unit is to support foreign students enrolled in undergraduate, postgraduate, and doctoral study programs of the HEI. Its responsibilities include:

1. Assisting international students with registration in English language programs at AUTH.
2. Supporting international students in obtaining entry visas and residence permits in Greece for study purposes, and liaising with the competent public authorities regarding these matters.
3. Facilitating the fast-track issuance of residence permits for study purposes, in accordance with Article 37 of Law 4251/2014 (A’ 80).
4. Supporting students during their settlement in Greece.
5. Cooperating with other relevant AUTH services to ensure the effective support of international students.
6. Organizing Greek language courses or courses in other foreign languages in collaboration with the relevant AUTH units.
7. Exercising any other responsibilities defined in the University’s Organization related to the mandate of the International Student Support Unit.

Administrative Support of the Program

The School of Chemistry (lead department) of AUTh, possessing long experience in the organization and implementation of first, second, and third cycle study programs, undertakes the overall administrative and technical support of the present Joint

Undergraduate Program of Studies in English. Secretariat support for the Program is provided by the Secretariat of the JEUPS, which may be staffed by personnel from the Secretariat of the School of Chemistry, constituting a basic operational arm of its administration, and operates under the supervision of the Program Steering Committee.

Specifically, the Program Secretariat:

1. Provides administrative support to the Steering Committee and the Director of the Program.
2. Handles all matters related to the educational lifecycle of students, from registration to graduation and issuance of the Diploma.
3. Maintains the Program's protocol, paper and digital archives.
4. Manages administrative processes related to the teaching staff of the Program (contracts, travel, etc.).
5. Collaborates with the Special Account for Research Funds (ELKE) of AUTH for the financial management of the Program and supports related

The coordination of the Program Secretariat, as well as the keeping of the Steering Committee's minutes, is undertaken by a staff member of the Physics Secretariat, who possesses the formal qualifications to act as a Head of Secretariat, in accordance with Article 1 of Law 3839/2010. The assignment is made by decision of the Steering Committee.

To support the needs of the Program, the following personnel may be employed, according to Article 104 of Law 4957/2022:

1. Members of the regular administrative staff of AUTH, with additional duties beyond their statutory obligations, by decision of the ELKE Research Committee, following a recommendation by the Steering Committee.

2. Additional personnel selected according to the procedure of Article 243 of Law 4957/2022.

The costs for all categories of personnel are borne exclusively by the Program's budget. Technical support for the Program's operation is centrally provided by specialized staff from the Digital Governance Unit of AUTH, the existing technical staff of the General Directorate of Technical Services and IT, and the technical staff of the Faculty of Sciences. The Program courses are conducted at the existing facilities and technical infrastructure of the participating Schools of AUTH.

Article 13
Type of Diploma of the JEUPS

The Degree/Diploma of the JEUPS is a public document and is awarded to the graduates of the Program.

The Degree/Diploma is issued by the Secretariat of the School of Chemistry. It lists and is co-signed by the Schools of Chemistry, Physics, and Mechanical Engineering and the Institution, and includes the emblem of AUTh, the date of completion of studies, the date of issuance of the degree, the graduation protocol number, the title of the JEUPS, the grade of the Degree/Diploma, the student's details, and the evaluation classification: Good, Very Good, Excellent.

A certificate of successful attendance and completion of the Program may be granted to the graduate prior to the formal award ceremony.

In addition to the Degree, a Diploma Supplement is also provided, in accordance with Article 15 of Law 3374/2005 and the Ministerial Decision Φ5/89656/B3/13-8-2007 (Government Gazette 1466/B’). The Diploma Supplement is an explanatory document providing detailed information regarding the nature, level, content, educational framework, and legal status of the studies successfully completed. It does not substitute the official qualification or the transcript of records issued by the Institution.

Article 15
Study Guide of the Joint Undergraduate Program of Studies in English

The Joint Undergraduate Program of Studies in English publishes a Study Guide in English to inform students about the operation of the Program. It is available on the Program’s website and is updated regularly. The Study Guide includes:

1. General Information and useful online links about the University and the School, particularly administrative services or collective bodies that undergraduate students may need to contact for the successful completion of their studies.
2. The purpose and objectives of the JEUPS, as well as the qualifications acquired upon award of the Diploma.
3. The academic calendar, including the start and end dates of academic semesters, examination periods, holidays, and any other commitments such as seminars, conferences, etc.
4. The curriculum, including courses, credit units (ECTS), study requirements, teaching staff, and the rights and responsibilities of students.
5. The official language of instruction.
6. The Steering Committee of JEUPS
7. Databases and other services.
8. Library use, according to the needs of the courses of the JEUPS
9. Learning outcomes and qualifications upon graduation.
10. University services available to students.

It is noted that in all texts, the terms “student(s)” and “professor(s)” are intended to be gender-inclusive.

B. PRACTICAL TRAINING REGULATION

The Program does not include mandatory practical training (internship). However, should such an option be offered in the future, the internship will be carried out in accordance with the regulations and practices set out in the Internship Regulation of Aristotle University of Thessaloniki, as published in Government Gazette (FEK) 5597- B/9.10.2024, and found on the website of the Student Practice Office Aristotle University of Thessaloniki.

(https://www.praktiki.auth.gr/%cf%80%ce%bb%ce%b7%cf%81%ce%bf%cf%86%ce%bf%cf%81%ce%af%ce%b5%cf%82-%ce%b3%ce%b9%ce%b1-%cf%86%ce%bf%ce%b9%cf%84%ce%b7%cf%84%ce%ad%cf%82/)

C. MOBILITY REGULATION

The Senate of the Aristotle University of Thessaloniki (AUTH), at its meeting No. 2980/20 & 21-2-2019, approved the adoption of good practices for the proper implementation of the ERASMUS+ Program. These practices apply proportionally to all cycles of study at AUTH, in accordance with the applicable legislation and the regulations of the respective Study Programs. The procedures are updated and specified in accordance with the relevant guidelines of the State Scholarships Foundation and are published by the Department of European and Educational Programs on its website. The decision of the Senate of the Aristotle University of Thessaloniki is set out below:

A) Outgoing Students

The following provisions aim to ensure the right of outgoing students to automatic and full recognition of their period of study at a partner institution, provided that they successfully complete their academic obligations.

1. When completing the Learning Agreement for Studies, which takes place prior to the commencement of the mobility period, the ECTS Coordinator, acting as the designated representative of the relevant School in accordance with Ministerial Decision No. F.821/2318T/89676/Z1, must ensure that the student’s workload at the Host Institution, as declared in the relevant table of the Learning Agreement (Table A), corresponds to 30 ECTS credits for one academic semester. For reasons of flexibility and taking into account the diversity of study Programs, a deviation from this rule is permitted, either positive or negative, corresponding to the credit value of one (1) course in the case of mobility for an academic trimester or semester, and two (2) courses in the case of mobility for a full academic year.

2. At the same stage, the ECTS Coordinator must ensure full recognition of the above workload by recording, in the corresponding table of the Learning Agreement (Table B), the courses and ECTS credits from which the student will be exempted upon successful completion of those listed in Table A. The framework of this procedure must be approved by the Assembly or the competent body of the School concerned through a relevant decision, which may be adopted once. This decision is recorded in the Application–Declaration form submitted by outgoing students to the Department of European Educational Programs.

3. Recognition is categorised as follows:

I. Compulsory courses, based on the curriculum of the relevant School of the Aristotle University of Thessaloniki, provided that the majority of the content of the course offered at the Host Institution corresponds to that of the course offered by the School.

Recognition: Courses successfully completed abroad are recognised under the title used by the relevant School. The signed consent of the course lecturer is required prior to the completion of the Learning Agreement.

II. Elective courses (specialisation or non-specialisation), based on the curriculum of the relevant School, for which strict content correspondence is not required, provided that their relevance to the subject area covered by the School or Section/Specialisation is ensured.

Recognition: Courses successfully completed abroad may be recognised either under their original title at the Host Institution or under the title of a corresponding course in the relevant School, provided that content correspondence exists. For information purposes, it is noted that the

Secretariat’s electronic system supports the recognition and inclusion of Exchange Program Courses (PAN courses) in the Study Program. These may be declared in the Learning Agreement either by title or as an “elective course” (specialisation or non-specialisation).
It is recommended that a sufficient number of elective courses be included in study Programs relevant to the School’s academic field, as this provides flexibility in course recognition and enriches curricula with subjects not offered internally but relevant to the Program of study.
III. Free-choice courses, for which there is no requirement for content correspondence or relevance to the subject area of the School or Section/Specialisation.
Recognition: Courses successfully completed abroad are recognised under their original title at the Host Institution. The maximum number of ECTS credits for free- choice courses declared in the Learning Agreement must not exceed the number permitted by the relevant Study Program. These courses may also be declared without a title as “free-choice courses”.
It is also recommended, in the context of upcoming curriculum reforms, to introduce a small number of elective courses (e.g., 6–10 ECTS each)."
4. In the case of courses that fall within the subject area of the relevant School (compulsory or elective), detailed examples of recognition are provided in Appendix I (attached). Courses that do not fall within the subject area of the relevant School are recognised as free-choice courses, as noted above. For the recognition of credits from such courses, the alternative combinations set out in Appendix I apply. When selecting courses and preparing the Learning Agreement, outgoing students are guided by the ECTS Coordinator to ensure that, if courses outside the subject area are selected, they correspond to the maximum number of ECTS credits for free-choice courses permitted by the Study Program of the relevant School. This ensures their recognition upon return from the Host Institution. The inclusion of such courses fulfils the requirement for full recognition of the mobility period (60 ECTS credits for an academic year, 30 ECTS credits for an academic semester, and 20 ECTS credits for an academic trimester).
5. In cases where there is a discrepancy in the number of ECTS credits between the Aristotle University of Thessaloniki and the Host Institution, maximum flexibility shall be applied and all possible combinations of recognition shall be considered after the student’s return, always within the framework of the regulations of the relevant Study Program. In all cases, every effort must be made to ensure the recognition of all credits obtained by the student at the Host Institution. This process shall take into account the principle of “fair recognition” set out in the ECTS Guide, which allows for a deviation of one (1) or two (2) ECTS credits, always in favour of the student.
6. Upon the students’ return, the recognition of all credits earned is MANDATORY, provided that the student has successfully completed the agreed examinations or assessments. Recognition follows the signed Learning Agreement (initial or amended), which is binding on both the School and the Aristotle University of Thessaloniki. Outgoing students may make use of the provision of Article 60 of the Regulation of the Aristotle University of Thessaloniki at the end of their studies, which provides that students are entitled to be examined in two additional elective courses, the grades of which may replace lower grades in other elective courses. On this basis, and only at the end of their studies, students may submit a personal statement requesting that two elective courses — which may include courses successfully completed at the Host Institution — not be included in the calculation of the final Diploma grade, provided that the required number of ECTS credits for the award of the Diploma has been completed.
7. Additional ECTS credits from free-choice courses that exceed the limits provided for by the Study Programs of the Schools of the Aristotle University of Thessaloniki usually indicate an inappropriate selection of courses in the Learning Agreement, unless the Host Institution does not offer alternative course options to Erasmus students. In such cases, the ECTS Coordinators must re-examine the curriculum
of the partner institution. If it is determined that the curriculum does not meet the requirements for the recognition of courses for undergraduate exchange students, the following options may be considered: (a) limiting the bilateral agreement to second- and third-cycle student mobility (Master’s and doctoral level), (b) limiting the bilateral agreement exclusively to staff mobility, or (c) terminating the bilateral agreement with the specific institution. Furthermore, the Department of

European and Educational Programs annually invites Schools to evaluate their bilateral agreements. Course availability for students constitutes a critical evaluation criterion and may lead to the modification or termination of a bilateral agreement.

8. In view of the above, it is recommended that ECTS Coordinators inform students about mobility opportunities through the Erasmus+ Program from the early stages of their studies at the Aristotle University of Thessaloniki. Timely information enables students to plan effectively with regard to course categories available at Host Institutions and the required number of ECTS credits for the mobility period.

9. The role of the ECTS Coordinator of a School, as defined by Ministerial Decision No. Φ.821/2318Τ/89676/Ζ1, is considered particularly important, as it ensures the proper implementation of the Erasmus+ Program within the School and, by extension, at the Aristotle University of Thessaloniki. This role is directly linked to the full recognition of the study period completed by outgoing students at the Host Institution.

For this reason, it is recommended that the ECTS Coordinator not be replaced frequently, in order to ensure continuity and effective management of student mobility. It is also proposed that the ECTS Coordinator be a member of the Curriculum Committee of the relevant School, given the strong interconnection between mobility issues and curriculum design, as well as a member of the School Assembly, in order to inform its members about Erasmus+ matters. These issues concern a significant number of students (at least 600 students per year), who benefit from the guidance and advisory role of the ECTS Coordinator and are entitled to full recognition of their studies at the Host Institution.

B) Incoming Students

1. It is necessary to ensure that incoming exchange students possess an adequate level of proficiency in the language of instruction, in accordance with the terms of the bilateral agreement. Where required by the School and provided that this obligation is included in the annex to the bilateral agreement, the submission of a recognised language proficiency certificate is recommended.
2. Incoming students' grades (Transcript of Records) must be submitted to their home institutions no later than five (5) weeks after the end of the mobility period. Failure to comply with this obligation may constitute grounds for the termination of cooperation between the two institutions. For this reason, the ECTS Coordinator, in cooperation with the members of the School Secretariat, must ensure that the grades of incoming students are transmitted in a timely manner.

It is noted that the terms "student", "students", "professor", and "professors" refer to all genders.

D. DIPLOMA THESIS REGULATION

(According to the decision No 893/30-3-2026 of the Assembly of School of Chemistry, AUTH)

For the preparation of a Diploma Thesis (DT), the Steering Committee, following an application by the candidate, in which a proposed title and supervisor of the Thesis is indicated and a summary of the proposed thesis is attached, appoints its supervisor and then establishes a three-member Examination Committee for the approval of the thesis, one member of which is the supervisor.

Supervisors

Supervisors of diploma theses are members of the teaching staff within the following categories, as described in the article 103 of Law 4957/2022 for Foreign Language

Programs:

a) members of Teaching Research Staff (D.E.P.), Special Educational Staff (E.E.P.), Laboratory Teaching Staff (E.D.I.P.) and Specialized Technical Laboratory Staff (E.T.E.P.) of the School or

other Schools of the same or another Higher Educational Institution (A.E.I.) or Higher Military Educational Institution (A.S.E.I.), with additional employment beyond their legal obligations, if the P.P.S. has tuition fees,
b) emeritus Professors or retired members of the Faculty of Education of the Department or other Departments of the same or another Universities (A.E.I.,)
c) collaboration instructors,
d) appointed instructors,
e) visiting professors or visiting researchers
f) researchers and special scientists of research and technological institutions according to article 13A of Law 4310/2014 (A΄ 258) or other research centers and institutes of the country or abroad.

The members of the Three-member Examining Committee must have the same or related scientific specialty as the scientific field of the P.P.S.

Writing and presentation

To proceed with the public presentation of the Diploma Thesis, a positive recommendation from the Three-Member Examining Committee is required. For the public defense of the Diploma Thesis, a specific date and place is set by the Steering Committee
The Diploma Thesis is written in English.
Upon final submission of the Thesis, the first pages of the manuscript must state the Institution and the Program in which it was carried out, as well as the supervisor and the members of the Examination Committee, including their roles and academic ranks.
For the presentation of the Diploma Thesis, a positive recommendation by the three-member Examination Committee is required. The Thesis is defended before the three- member Examination Committee on a date and at a venue determined by the Steering Committee and approved by the Director of the Program. The presentation is public and is announced at least three (3) days in advance on the Program's website. The teaching staff of the Program are informed under the responsibility of the Director of the Program.
Grading
After the defense of the Diploma Thesis, minutes are drawn up in which the individual grade of each member of the Three-Member Examining Committee, the average score as well as any comments or remarks are mentioned. The evaluation is considered positive if the grade is above 6 (six out of ten). Following its approval by the Committee, it is compulsorily posted on the School's website.
If the evaluation of the Diploma Thesis is negative, the student can submit his work incorporating the remarks for its improvement within a period of time set by the Three-member Examining Committee, which in any case can not exceed 6 months from the initial evaluation. In case the second evaluation is negative, the student can not be awarded the Diploma.
In exceptional cases, when an objective weakness or other important reason arises, it is possible to replace the supervisor or a member of the Three-Member Examining Committee or change the subject of the Diploma Thesis following a decision of the Steering Committee.

Plagiarism

The preparation of the Diploma Thesis (DT) is governed by the Code of Academic Ethics of AUTH. Every creator or co-creator of any intellectual work is entitled to be mentioned and recognized as such, enjoying both the property and moral rights deriving from the specific work. In the case where the original intellectual creation ("work") is the final output of a paid research project, which has been commissioned by an entity outside AUTH, the property rights of the creator or co-creators may be limited based on the terms of the contract with which the research project is assigned, while the moral rights remain in the creator(s), subject to the necessary - for making use of the produced intellectual creation - contractual restrictions.

By submitting any thesis, the student is required to reference the work and views of others used in their work. Copying is considered a serious academic misconduct. Plagiarism is defined as using another's work, published or not, without proper reference. Quoting any documentary material, even from the candidate's own work, without a relevant reference, may justify a decision of the Assembly of the School to reject it. In the above cases - and after a reasoned proposition from the supervising professor - the Assembly of the relevant School may decide to expel him/her from the Program. Any misconduct or violation of academic ethics is referred to the Steering Committee to be examined and addressed. The offenses of copying, plagiarism and any violation of the provisions on intellectual property by a student, stand for all writing assignments in the context of courses as well as the preparation of the diploma thesis

It is noted that the terms "student", "students", "professor", "professors" refer to all genders.

Indicative Guide for Writing Undergraduate Thesis Projects

The indicative Guide for Writing Undergraduate Thesis Projects aims to provide guidelines that students should follow and includes basic rules for the structure, writing, and presentation of the thesis prepared by the student. However, its final form will always be determined in collaboration with the supervisor so that it is as complete and well-structured as possible. Indicatively, the thesis should include:

Title

The title, which should briefly but as clearly as possible express the exact subject of the thesis, is determined after consultation between the student and the supervisor.

Abstract

The abstract briefly describes the entire content of the thesis (approximately one page), emphasizing its objective, the experimental methodology followed, the results obtained, and finally the conclusions. The abstract may also be written in English.

Table of Contents

The table of contents lists the individual chapters and subsections of the thesis along with the corresponding page numbers, so that the reader can access them more easily.

Introduction

The introduction constitutes, in a way, the theoretical part of the thesis and aims to introduce the reader to the scientific subject addressed by the study. Therefore, this section provides general information based on a review of the relevant bibliography and previous research conducted up to the preparation of the thesis. This section should not exceed 50% of the total manuscript, with 30% being preferable. Finally, the objectives and necessity of conducting the thesis are described, emphasizing the investigation of a scientific subject and the (potentially desirable) development of scientific excellence.

Experimental / Research Part

The experimental section describes in detail the methodology of the study and the experiments conducted. It also includes references to the techniques and equipment used. At this point, a brief description of the operating principles of each scientific instrument and the techniques used may also be included (1–2 pages), purely for educational purposes.

Results and Discussion

The results obtained during the laboratory research through the application of the relevant methodology are presented in detail and separately. At the same time, the corresponding processing of the results, scientific interpretation, and discussion are carried out, as well as their correlation, where possible, with previous scientific studies. The aim is to highlight the new findings and innovation of the thesis in relation to existing knowledge. This section is the most essential part of the thesis, where the student presents the entirety of their work. The success of the thesis is judged mainly on this section. Emphasis should be placed on the knowledge acquired by the student regarding the methodology followed, the scientific analysis of the results, and the ability to manage a similar or even different research problem in the future.

Conclusions

The main conclusions of the thesis are presented, as derived from the evaluation of the experimental results (1–2 pages). An assessment should also be made regarding the extent to which the objectives of the thesis were achieved.

Suggestions

This is the final section of the thesis, where the student presents, based on the research experience gained through engagement with the relevant scientific field, new ideas and proposes ways for the continuation or further development of the scientific study.

Bibliography

The bibliography includes scientific articles, doctoral dissertations, books, and any other sources that have been used and cited in the thesis, usually presented either alphabetically or numerically according to a standard referencing style (e.g., Oxford style).