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Preface

1 City of Thessaloniki

Thessaloniki, the second largest city in Greece, is one of the oldest in Europe. Built amphitheatrically on the shores and hills of the Thermaic Gulf, it stretches for many kilometers. It was built by Cassander, the king of Macedonia, around 315 BC, and named after his wife, Thessaloniki, sister of Alexander the Great. Since then, Thessaloniki has become the most important city in Macedonia and its first commercial port. In Roman times, Paul, the Apostle to the Gentiles, visited the city and preached the new religion and later sent its Christian inhabitants his two well-known letters “to the Thessalonians”, which are among the oldest monuments of Christian literature.

During the Byzantine period, Thessaloniki became the second intellectual and artistic center of the empire – after Constantinople. Great figures of religion, science and art are associated with its Byzantine past: the jurist Peter Magister, the epigrammatist Macedonian Hypatos, the hymnographer Archbishop Joseph, Leo the Mathematician, the historian John Kameniatis, the Archbishop of Thessaloniki Eustathius, a prolific Homericist and humanist, the philologist Thomas Magister, the law teacher Constantine Armenopoulos, author of the “Hexabiblos”, the theologian Gregory Palamas, Archbishop of Thessaloniki and others. In the same period, the missionary brothers Cyril and Methodius hold a special place, having spread Christianity to the Slavs and inventing, for the success of their missionary work, a special alphabet, the Cyrillic alphabet, which is still used today by almost all Slavic languages.

Later, when first Thessaloniki (1430) and then Constantinople (1453), the two main intellectual centers in the East, succumbed to the Turkish invasion, among the Greek humanists who sought refuge in the Christian West and transplanted Greek education there, two were Thessalonians, Theodore Gazis and Andronikos Kallistos. And during the Turkish occupation, although times were very difficult, Greek schools operated in Thessaloniki, which maintained the tradition of Greek education until its liberation on October 26, 1912, the anniversary of its patron saint, Saint Demetrius. During the 19th century, the city's intellectual tradition was continued by the historian, archaeologist and geographer Margaritis Dimitisa, who was also the director of the city's Gymnasium, and by his student P. Papageorgiou, later a distinguished philologist.

Numerous monuments have been preserved in the city from its historical past. In the area of Thessaloniki, the first organized settlements were founded at the end of the 4th millennium BC. In these settlements, a prehistoric civilization developed within the framework of a mixed economy based on agriculture, animal husbandry and gathering. This civilization was slowly transformed through contacts with other Greek civilizations and covered two millennia, approximately until 1100 AD. Since this era, which is known as the Iron Age, the region has known a cultural balance in all sectors.

This helps in the development of small civilizations such as Thermi, Apollonia, Chalastra, etc. with autonomous development. Proof of this development are the rich archaeological finds found in many parts of the area of the city of Thessaloniki and dating back to before 315 BC. The significant development of these small settlements will lead to the founding of Thessaloniki, that is, to their settlement, as happened in Athens with Theseus. This settlement, which is formalized in 315 BC, means the decision to gather the socio-economic elements scattered in the wider area, since the prehistoric period, and to play their special historical role, under a single central authority. Thus, the new city of Thessaloniki, founded by Cassander, acquires great economic and political power and imposes itself as a cultural presence in Macedonia.

It is perhaps surprising that despite its significant political and economic importance, Thessaloniki did not gain the “sympathy” of the kings of the Macedonian state who had their headquarters in Aigai and Pella. The city will gain political prominence in the Roman years, when it reaches its peak, and the Roman general Aemilius Paullus calls it the capital of Macedonia and Epirus. Of great interest from the Roman period are the Arch of Galerius (the “Arch”) and the Rotunda. From the Byzantine era, churches representing the various periods of Byzantine art have survived and are jewels of the city, rich in excellent mosaics and frescoes: Agios Demetrios, Acheiropoietos, Hagia Sophia, the Holy Apostles, Agia Catherine, Panagia Chalkeon, Agios Nikolaos the Orphan, Prophet Elias, the Monastery of Vlatadon, and Osios David. A large part of the city walls is still preserved, part of which were the White Tower, the Seven Towers, etc. The uninterrupted contact and interaction between Mount Athos and Thessaloniki was remarkable from a national, spiritual and artistic point of view.

A new period for the material and spiritual development of Thessaloniki begins with its liberation from the Turkish yoke. Thessaloniki becomes the main economic, political and cultural center of Northern Greece and the second largest and most important city in the country. Today, Thessaloniki is the seat of the Ministry of Macedonia - Thrace, the Metropolitanate, the Court of Appeal and other administrative authorities. Two parts can be distinguished in the city: the older districts, which are constantly changing with new constructions, and the area with modern buildings, most of which are apartment buildings.

In addition to the Aristotle University of Thessaloniki, numerous institutions contribute to the creation of a broader intellectual climate in the city: the University of Macedonia, the International Hellenic University, its Museums (Archaeological, Byzantine, Folklore, etc.), the State Conservatory, the State Theater, the State Orchestra, the Society for Macedonian Studies, the Foundation for Studies of the Aemos Peninsula and other intellectual and artistic structures. Characteristics of the flourishing economy of Thessaloniki, which is one of the most important commercial and transportation centers in the Mediterranean, are its port, which with the Free Zone serves other Balkan countries, the international airport, the internationally important Industrial Area and its International Fair.

2 The Aristotle University of Thessaloniki (A.U.Th.)

2.1 History-Structure

The University of Thessaloniki was founded by the First Hellenic Republic. On the proposal of Alexandros Papanastasiou, the Fourth National Assembly passed Law 3341 on 14 June 1925, establishing five Faculties: the Theological, the Philosophical, the Faculty of Law and Economics, the Faculty of Physics and Mathematics and the Faculty of Medicine. The Faculty of Philosophy was the first to start operating in 1926. The Faculty of Physics and Mathematics followed in the academic year 1927-28, initially with the Departments of Agriculture and Forestry and from 1928-29 with its new departments of Physics and Mathematics. The same year, the Department of Law was opened, and from 1929-30, the Department of Political and Economic Sciences of the Faculty of Law and Economics. Since then, many Schools have been created and operate, covering the entire spectrum of Sciences and Fine Arts.

The Aristotle University of Thessaloniki is currently the largest and most complex University in Greece with 11 faculties and 41 departments (Figure 1). There are 61 Clinics (Medicine, Dentistry, Veterinary Medicine), 295 institutionalized Laboratories and 23 Study Centers. The Central Library of the Aristotle University of Thessaloniki, one of the largest in the Balkans, together with the 45 regional libraries of the Departments and Faculties (17 of which are institutionalized) constitute the library system of the Aristotle University of Thessaloniki. There are 43 undergraduate and 185 postgraduate programmes operating at the Aristotle University of Thessaloniki, while 90,299 students are enrolled, of whom 76,987 are attending undergraduate programmes and 8,496 postgraduate programmes. Also, 4,609 are doctoral candidates. The Teaching and Research Staff (T.E.P.) amounts to 1,612 people, the Laboratory Teaching Staff (E.D.I.P.) to 371 people and the Special Educational Staff to 98. The educational work is assisted by 127 members of the Special Technical Laboratory Staff (E.T.E.P.), while the Administration employs 253 Permanent Employees and 267 with a Private Law Indefinite Term (ID.A.X.).

The majority of the facilities of the Aristotle University of Thessaloniki are located within the Central Campus in the city center of Thessaloniki and extend over an area of approximately 334,000 m². However, due to the dense construction of the Central Campus, as well as for operational reasons, some of the University's facilities are located outside the campus or even outside the urban complex of Thessaloniki, with the main facilities in Thessaloniki, where the Department of Visual and Applied Arts, the Department of Music Studies of the School of Fine Arts, as well as the Department of Physical Education and Sports Science are housed. Of the remaining facilities of the Aristotle University of Thessaloniki, outside the University Campus, we indicatively mention the University Farm (1,800 acres on the eastern exit of Thessaloniki), the Veterinary School Clinics (at 11 Stavrou Voutyra Street, opposite the old railway station), the facilities of the Department of Forestry and Natural Environment in Finikas, Thessaloniki, where the Wildlife Museum and the Forest Botanical Garden are located, the University Excavations (in Vergina, Dion, Pella, Philippi, Karabournaki and Toumpa, Thessaloniki), the Center for Byzantine Research (at 36 Vas. Olgas Street),

the Teloglion Arts Foundation (at 159A Agiou Dimitriou Street), the Seismological Station (at Vyzoukidou Street 43, 40 Ekklisies), the Meteorological Stations of Olympus, the University Forests in Pertouli of Pindos and in Taxiarchis of Chalkidiki, which are a place for student practice and forestry research. Finally, the Department of Physical Education and Sports Science of Serres is located in Agios Ioannis of Serres.

ΣΧΟΛΕΣ & ΤΜΗΜΑΤΑ

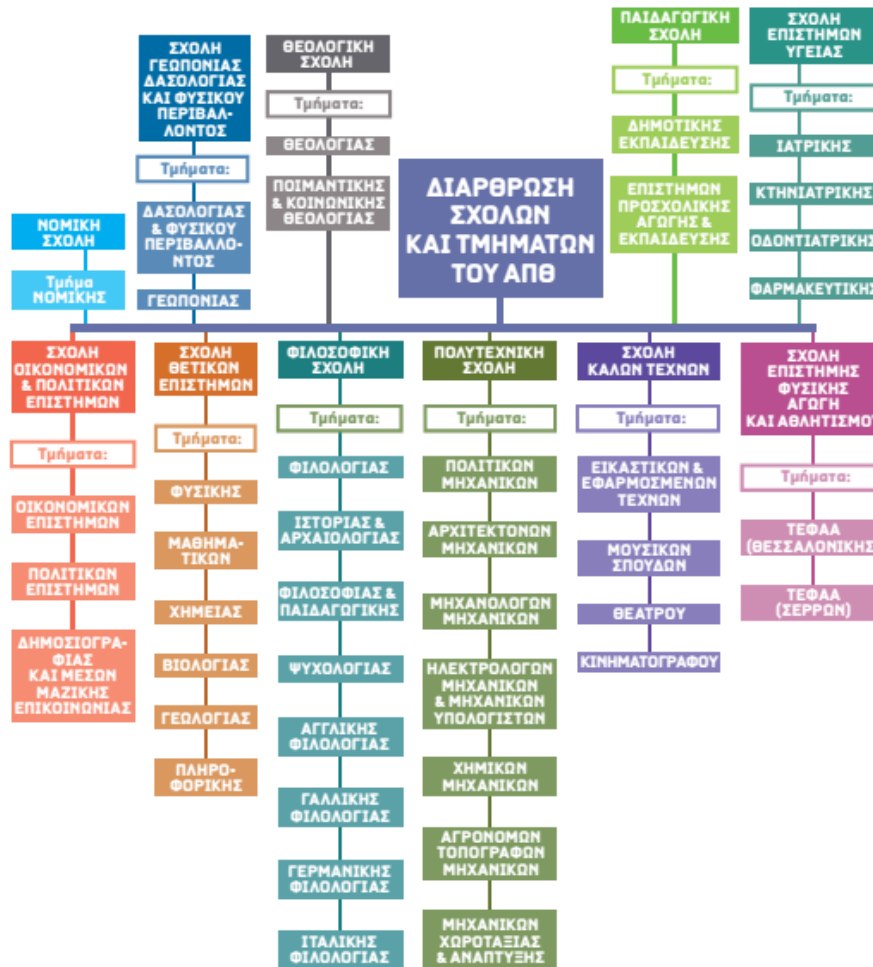


Figure 1. Faculties and Departments of the Aristotle University of Thessaloniki.

2.2 Student welfare – services for students

All students of the Aristotle University of Thessaloniki have the opportunity to contact the University's specialized services, for specific reasons, in order to receive support for issues they may encounter during their studies. At the same time, they can — if they wish — participate as volunteers, offering their help to fellow students in need.

More information: <http://www.auth.gr/services>

2.2.1 Libraries - & Information Center of Aristotle University of Thessaloniki (LICC)

The Library and Information Center (LICC) of the Aristotle University of Thessaloniki is one of the largest academic libraries in the country and a key pillar of support for education, study and research. It provides access to an extensive collection of printed and electronic material, such as books, scientific journals, databases, theses and digital resources. Students can use the study spaces of the Central Library and the individual libraries of the Departments, borrow books, search for material through the electronic catalog and have remote access to electronic resources with their institutional account. The LICC also provides user training services, support in the search for scientific information, access to computers and group study spaces, as well as special services for people with disabilities or special educational needs.

The library spaces are an important point of daily study and collaboration, especially during the examination period.

Useful Links & Contact:

-  BKP Website: <https://www.lib.auth.gr>
-  Online Catalogue (OPAC): <https://opac.lib.auth.gr>
-  Online resources & databases: <https://www.lib.auth.gr/el/resources>
-  Central Library: Aristotle University of Thessaloniki Campus, Thessaloniki
-  Email: info@lib.auth.gr
-  Phone: 2310 99 5300

2.2.2 Feeding

The student cafeteria is distributed in the Club's dining areas in two large halls with a capacity of 1,000 (Lower Club) and 500 people (Upper Club) respectively, while for the feeding of A.U.T. staff members, the Club <http://www.pfl.auth.gr/> has two smaller halls.

Outside the Club, meals are provided to students of the decentralized Departments of the School of Fine Arts in Themi and Stavroupoli, at the Department of Physical Education and Sport Science of Serres and Themi, at the Clinics of the Veterinary School, as well as at the Forestry facilities in Finikas. Finally, during the summer months, the Club undertakes the meals of Forestry students who do their internship

at the University Forests in Pertouli, Trikala and Taxiarchis, Halkidiki and supports the operation of the A.U.T.H. Camp in Kalandra, Halkidiki.

Today, the Club has the capacity to produce over 15,000 meals per day. Free meals are provided to all undergraduate and postgraduate students who are not graduates of another university or technical institute and who do not have a high income themselves or their parents (as evidenced by a tax return), to expatriates, Cypriots, foreigners who have been granted a scholarship and to certain other categories of students, under specific conditions.

2.2.3 Medical care – Health services

The health and social policy services of the Aristotle University of Thessaloniki include the Primary Health Care Center, the Counseling and Psychological Support Center, the regulation on student healthcare, the activities of the Social Policy and Health Committee and the Observatory Committee for the Academic Progress of Aristotle University of Thessaloniki Students belonging to sensitive social groups, as well as the operation of the Diagnostic Unit of the School of Dentistry.

Counseling and Psychological Support Center (CPS)

The Center for Counseling and Psychological Support (CPS) of the Aristotle University of Thessaloniki provides free psychological support and counseling services to members of the university community. Its goal is to enhance the mental health, well-being and academic adjustment of students, as well as support in personal, emotional or educational difficulties that may arise during their studies.


The Center's services are aimed at all students of the Aristotle University of Thessaloniki, as well as University staff. Individual counseling and psychological support are provided by specialized mental health professionals, in an environment of confidentiality, respect and acceptance.


The CPS collaborates with other committees and structures of the University that are active in related issues and organizes informational actions, workshops and workshops aimed at prevention, awareness and dialogue around issues of mental health and student life, both with students and with administrative and other staff.

The Center's goals also include operating an open telephone support line for people in crisis or facing personal difficulties. The ability to communicate anonymously, without eye contact, can make it easier for those who feel safer to talk about their problems in this way.


The services of KE.SY.PSY. are confidential and aim at prevention, early intervention and strengthening the mental resilience of members of the university community.

Contact Information

 **Location:** Aristotle University of Thessaloniki Campus, Thessaloniki

 **Phone:** 2310 99 1313

 **Email:** kesypy@auth.gr

 **Website:** <https://kesypy.auth.gr>

Social Policy and Health Committee

The Social Policy and Health Committee of the Aristotle University of Thessaloniki aims to create conditions that make the University accessible and friendly to all members of the university community, with special attention to people with disabilities (PWDs). The main goal is to remove obstacles that limit equal access to University spaces, services and knowledge.

In this context, support actions are implemented for students with disabilities or special educational needs. For example, students with visual impairments are trained by specialized faculty members in the use of special technological equipment in the libraries of the Aristotle University of Thessaloniki, where Braille printers are also available. At the same time, efforts are made to make books available in accessible formats, such as audio versions.

To facilitate daily transportation, a special bus is provided for people with disabilities, which serves students during the academic year and the examination period, contributing to their unhindered participation in the educational process.

The Committee also collaborates with bodies and structures that promote health and social support. In this context, the Self-Help Promotion Programme operates, in collaboration with the Aristotle University of Thessaloniki and OKANA, which provides support to individuals facing addictions and related psychosocial issues, promoting empowerment and social reintegration.

The Committee's actions aim to create an inclusive University, where all can participate equally in academic and social life.

Contact Information

 **Self-Help Promotion Programme:** selfhelp@auth.gr

 **Programme Website:** <http://www.selfhelp.gr/el/>

2.2.4 Sports-Arts-Entertainment

The Aristotle University of Thessaloniki has a modern University Gymnasium where students of the University can exercise. Its facilities are located next to the Student University Club (tel. 2310992672) and include gyms, football, basketball, volleyball, tennis courts, etc.

The University Student Club operates a hall for intellectual games, a music department for students with musical interests, a reading room, a canteen with low prices that operates as a disco in the evening, a barbershop and a hairdresser with low prices, etc. Students of the Department of Agriculture can also participate in the events of their student club which include theatrical performances, educational or recreational excursions and various cultural, social and sporting events. In the summer, students can also spend their holidays at the University camps located in Possidi, Halkidiki.

Digital Governance Unit (DGU) Aristotle University of Thessaloniki

The Digital Governance Unit (DGU) of the Aristotle University of Thessaloniki is responsible for the development, operation and support of the University's information systems and digital services. Its goal is to provide reliable and secure electronic services that facilitate studying, teaching and daily academic activity.

Through the services of the DGU, students gain access to all the basic digital infrastructures of the Aristotle University of Thessaloniki. With their institutional account, they can use the university email, network services, the Secretariat's information systems and distance learning platforms.

Obtaining and activating an institutional account is a prerequisite for accessing the University's online services. Through it, students can register for courses, be informed about their grades, receive certificates and use the university email.

Particularly important is access to the eLearning platform (electronic courses), where notes, presentations, course announcements, exercises, assignments and other educational material are posted. Through this platform, teachers communicate with students, organize online activities and collect assignments.

DGU also provides technical support for account activation issues, password resets, connection problems and use of digital services.

Useful Links

 **eLearning (Electronic Courses):** <https://elearning.auth.gr>

 **Course registration & Secretariat services (SIS):** <https://sis.auth.gr>

 Obtain / activate an institutional account: <https://register.auth.gr>

 MOΦΔ website: <https://it.auth.gr>

 User support (Helpdesk): support@auth.gr

 Helpdesk phone: 2310 99 9000

Academic Calendar

The academic year begins on September 1 and ends on August 31 of the following calendar year. The educational work of each academic year is structured into two semesters of study, winter and spring, each of which includes 13 weeks of teaching and two or three weeks of examinations.

The winter semester begins in the last week of September and ends at the beginning of the last ten days of January. This is followed by the first examination period of the winter semester.

The spring semester begins in mid-February and ends in late May. This is followed by the first examination period of the spring semester.

The exact dates are determined by the university senate. However, in exceptional cases, the Minister of Education, upon a proposal from the senate, regulates the start and end of the two semesters outside the regular dates, in order to complete the necessary number of teaching weeks.

Each semester has two examination periods:

The winter semester courses are examined during the January - February period and repeated during the September period.

The spring semester courses are examined during the June period and repeated during the September period.

The January-February and September examination periods last three weeks, while the June one lasts two weeks according to the law, but all of them usually extend over a longer period.

Every semester, before the start of the examination period, students have the right and obligation to evaluate their courses and teachers, with the aim of improving the quality of their studies. More information is available on the website of the Quality Assurance Unit (QA-AUTH <http://qa.auth.gr>) and on the website of their School/Department.

HOLIDAYS

There are no classes or exams during the months of July and August and they are considered summer vacation months. Holidays also include:

Christmas holidays: From December 24 to January 7.

Carnival holidays: Clean Monday and the day after.

Easter holidays: From Holy Monday to Thomas Sunday.

October 26th: Feast of the city's patron saint, Saint Demetrius. Liberation of Thessaloniki (National holiday).

October 28th: Anniversary of the "OXI" to Italian fascism (National holiday).

November 17th: Anniversary of the 1973 Polytechnic uprising.

January 30th: Feast of the Three Hierarchs (Religious holiday).

March 25th: Anniversary of the 1821 revolution against the Turkish yoke (National holiday).

May 1st: May Day. – Day of class solidarity of workers (Labor Day – strike).

Day of the Holy Spirit: (Moveable religious holiday).

3 Participating Schools

3.1 Historical Development – Brief Description

The School of Chemistry was founded in 1943 and currently employs 54 faculty members, 10 assistant professors, 6 assistant professors and 6 administrative staff. The average number of students enrolled in the last 5 years is approximately 160 per year. The total number of active students in the Department is approximately 1800 undergraduates, 200 postgraduates and 120 doctoral candidates, while the total number of graduates is approximately 7500. Over 500 doctoral theses have been prepared in the Department of Chemistry. A significant number of active and retired faculty members (31) of the Department of Chemistry are ranked in the top 2% of research (8th edition, September 19, 2025) worldwide based on a bibliometric study published in collaboration with Elsevier and Stanford University, USA. Also, 10 faculty members of the Department are among the Highly Ranked Scholars of ScholarGPS (distinguished authors whose Top Percentage Rank places them in the top 0.05% of all academics due to their academic contribution in their entire life or the previous 5 years).

The School of Physics was founded in 1928 and since then has developed significantly both in terms of education and research, constituting one of the largest departments of the University in terms of staff, students and research activities, with an uninterrupted academic presence, rich research work and strong international recognition. Today it has approximately 3000 active students and more than 11000 physics graduates, 2000 postgraduate diploma holders and 500 PhD holders. Today it employs 50 faculty members and 25 members of auxiliary teaching, technical and administrative staff. The quality of the teaching and research staff, the large number of competitive research programmes it carries out and the extensive international collaborations through Erasmus+ constitute strong guarantees of credibility and academic excellence, which are not available to private competitors in the wider region.

In the School of Mechanical Engineering from the academic year 1972-73 to the academic year 2002-03, approximately 3900 students have been enrolled and 2400 Mechanical Engineers have graduated (including students and graduates of the first years of operation of the unified Department of Mechanical Engineering - Electrical Engineering). The number of students enrolled during the last five years has averaged 185, while the number of graduates has been 115. The Department of Mechanical Engineering currently employs 28 members of the Teaching and Research Staff (T&R), and approximately the same number of auxiliaries, technical and support staff. The Department is one of the most active at the Aristotle University of Thessaloniki in the field of research. Over the last five years, the total revenue from funded activities of its members exceeded €15,000,000.

3.2 Infrastructure and support equipment

The Schools of Chemistry, Physics and Mechanical Engineering have fully renovated and technologically equipped classrooms, which are fully sufficient to meet the needs of the Greek-speaking Undergraduate Study Programme and the under-established English-taught Undergraduate Study Programme. In total, more than ten amphitheatre rooms with a capacity of approximately 1500 people operate, as well as smaller classrooms, which are used for seminars, student groups and practical exercises. All rooms have wireless internet access and modern audiovisual equipment, while spaces with the possibility of hybrid and distance learning have been provided.

Most classrooms and auditoriums of the Departments are equipped with projectors, cameras, microphones, speakers and desktop or laptop computers, while several support the live broadcast of courses, seminars and scientific events.

At the same time, all participating Departments have computer labs, connected to a wired network, interactive whiteboard, television, video, projector and sound system. They are used for seminars, courses and research activities, while remaining accessible to all students, including incoming Erasmus students.

Secretariat and classrooms of the Programme

A suitable space has already been provided and configured to house the Secretariat, equipped with the necessary ICT means, which ensures smooth administrative operation and effective service to students. The Departments have sufficient rooms that have been provided for the needs of the Programme, with modern audiovisual equipment and the possibility of hybrid and distance learning. These rooms fully cover the requirements of the educational process during the first years of operation of the Programme. In addition, to cover the laboratory exercises of the courses, the collaborating Departments have the appropriate rooms fully equipped to meet the needs of students regarding the acquisition of experimental measurement skills. The various collaborating Schools of the Programme are located in various parts of the University Campus of the Aristotle University of Thessaloniki, as shown in Figure 2.

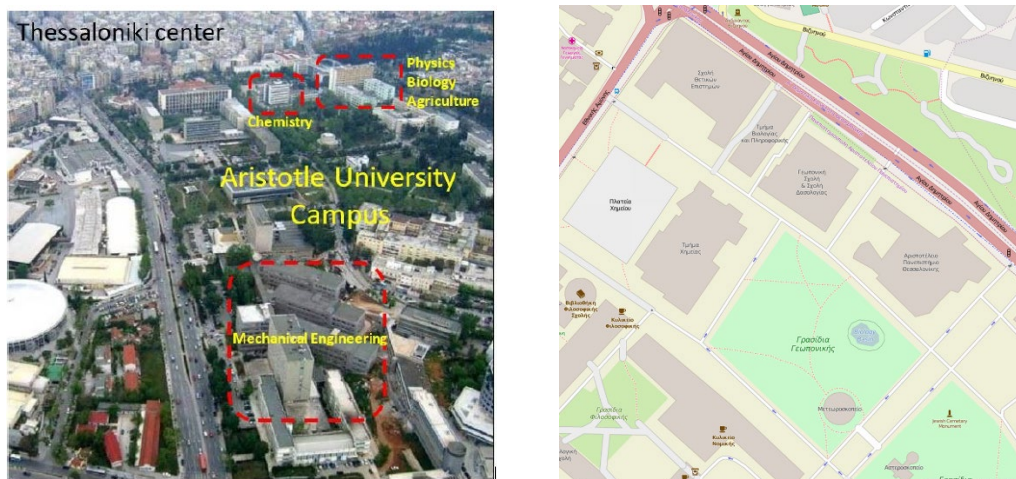


Figure 2. Location of the collaborating Schools on the Aristotle University of Thessaloniki Campus

Library and modern examination methods

At the same time, students will have access to the rich collection of the Schools' libraries and access to international databases, which ensure unhindered access to scientific sources, essentially enhancing the development of their research skills. At the same time, the collection of the Libraries and the Aristotle Information Center hosts collections related to the subject of the Programme and access to international databases.

Finally, the written exams that will be held at the end of each semester may be held digitally, using tablets inside the exam rooms, in the presence of invigilators and examinees, in order to fully ensure the integrity and reliability of the process.

Connecting teaching and research

Teaching at the Programme is organically linked to the research activity of the Schools of Physics, Chemistry, Biology, Mechanical Engineering and Agriculture, utilizing the scientific expertise and international networks of the faculty members. In this way, the teaching process is enriched with the findings of modern environmental science and provides students with the opportunity to directly connect teaching with research and practice.

Students are encouraged to develop their research skills from the first semesters of their studies, through the preparation of papers, their participation in seminars, workshops and conferences, as well as collaboration with members of the teaching staff in research initiatives. In recent years, their engagement with research is

deepened through elective courses corresponding to distinct thematic units, depending on the interests they have developed during their studies.

Laboratories and research structures

The Departments of Chemistry, Physics and Mechanical Engineering have research units in a wide range of disciplines, such as the Laboratory of Physical Chemistry, Laboratory of Organic Chemistry, Laboratory of Inorganic Chemistry, Laboratory of Quantum and Computational Chemistry, Laboratory of Biochemistry, Laboratory of Chemical and Environmental Technology, Laboratory of Analytical Chemistry, Laboratory of Polymer and Dye Chemistry and Technology.

4 Organization of Studies of the Interdepartmental Foreign Language Undergraduate Study Programme – Materials Science and Engineering

4.1 The Curriculum

The Schools of Chemistry (Coordinating), Physics and Mechanical Engineering of the Aristotle University of Thessaloniki, organize and operate an Interdepartmental Foreign Language Undergraduate Studies Programme (hereinafter Programme) with the subject of Materials Science and Engineering. The programme includes a study guide and offers two educational options:

- four-year cycle of studies (1st to 8th semester of studies), leading to the award of a Degree (Bachelor of Science in Materials Science and Engineering), and
- a five-year integrated cycle of studies (1st to 10th semester of studies), which culminates in the award of a single and indivisible postgraduate degree (Diploma with Integrated Master in Materials Science and Engineering).

The four-year cycle degree corresponds to level 6, while the five-year cycle corresponds to level 7 of the National and European Qualifications Framework, in accordance with article 47 of Law 4763/2020 (A'254).

The present Regulation of Undergraduate Studies is drawn up in accordance with the provisions of Chapter G' of Law 4957/2022 (Government Gazette A', 141/21.07.2022) "New Horizons in Higher Education Institutions: Strengthening the quality, functionality and connection of HEIs with society and other provisions", which concern the organization and operation of study programmes, as well as Chapter IA' of the same law, which specifically concerns Foreign Language Undergraduate Study Programmes. Furthermore, it is harmonized with the Regulation of Operation of Undergraduate Study Programmes of the Aristotle University of Thessaloniki, ensuring

that the provisions herein are in line with the current institutional framework of the institution.

The objective of the Interdepartmental Foreign Language Undergraduate Studies Programme is the systematic education and specialization of students in Materials Science and Engineering, with an emphasis on connecting theoretical knowledge with applied research and industrial practice. The Programme provides students with the necessary knowledge and skills for access to scientific and technological professions related to the development, characterization, processing and applications of advanced materials, as well as for any other professional or academic activity that requires high-level training in this field.

The purpose of the Programme is to provide a high level of interdisciplinary education to an international audience, through systematic familiarization with the main scientific fields, modern technological developments and the basic directions of the Materials sector. The Programme aims to:

- in cultivating analytical, critical evaluation and problem-solving skills for complex technical and scientific problems,
- in developing skills in experimental research, technological application and innovation,
- in enhancing critical thinking, scientific deepening and creative utilization of knowledge,
- in promoting the scientific work and academic footprint of the Aristotle University of Thessaloniki in the international environment,
- as well as in generally enhancing the extroversion of the participating Departments and the Institution.

Learning Outcomes and Qualifications

The expected learning outcomes of the Program cover a broad range of knowledge, skills, and competences, in accordance with **Level 6/7 of the European and National Qualifications Frameworks**. Upon successful completion of the **five-year version of the Interdepartmental Foreign-Language Undergraduate Program**, students will have acquired:

- solid theoretical knowledge in all core areas of **Materials Science and Engineering**,
- understanding of fundamental concepts in **physics, chemistry, mathematics, computer programming, the use of computational tools, and data processing**,
- familiarity with scientific, technological, and engineering processes related to the **design, development, characterization, optimization, and application of materials**,
- adequate scientific and technical training enabling employment in **research centers, industrial units, and technological organizations**,

- development of skills in **intercultural communication, oral presentation, and written scientific documentation,**
- deeper specialization in selected areas of materials science and engineering, including **extensive training in technical report writing and presentation, incorporating elements of economic evaluation,** aimed at the **design and technical assessment of technological applications of materials,**
- the ability to **pursue doctoral studies** for graduates of the five-year cycle and, under certain conditions, **access to professional rights internationally.**

Upon successful completion of the **four-year version of the Interdepartmental Foreign-Language Undergraduate Program,** students will have acquired:

- solid theoretical knowledge in all core areas of **Materials Science and Engineering,**
- understanding of fundamental concepts in **physics, chemistry, mathematics, computer programming, the use of computational tools, and data processing,**
- familiarity with scientific, technological, and engineering processes related to the **design, development, characterization, optimization, and application of materials,**
- adequate scientific and technical training enabling employment in **research centers, industrial units, and technological organizations,**
- development of skills in **intercultural communication, oral presentation, and written scientific documentation,**
- the ability to **continue their studies at the postgraduate (Master’s) level** for those who complete the four-year cycle.

The Program provides students with the **academic prerequisites for postgraduate and doctoral studies,** as well as the **professional qualifications necessary for careers in fields requiring well-documented scientific knowledge and technological competence.**

The **degree/diploma awarded** is equivalent to the degrees/diplomas granted by the **Greek-language study programs of Greek Higher Education Institutions (HEIs)** and is recognized as corresponding to degrees/diplomas from **similar programs offered by universities abroad.**

4.2 Awarded Title of the Programme

The Programme of the Schools of Chemistry (accelerated), Physics and Mechanical Engineering of the Aristotle University of Thessaloniki awards a “Bachelor of Science in Materials Science and Engineering” Degree in its 4-year version and a Diploma that leads to the award of a single and indivisible postgraduate degree “Diploma with Integrated Master in Materials Science and Engineering” in its 5-year version.

Successful completion of the studies corresponds to level six (6) for the 4-year version of the programme and seven (7) for its 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).

4.3 Bodies of the Programme

The competent bodies for the organization, administration and operation of the Interdepartmental Foreign Language Undergraduate Study Programme “Materials Science and Engineering” of the Schools of Chemistry, Physics and Mechanical Engineering are the following:

1. The Senate of the Aristotle University of Thessaloniki
2. The Curriculum Committee of the Programme of the collaborating Schools
3. The Director of the Programme of the School
4. The Assemblies of the participating Schools (School of Chemistry, School of Physics and Mechanical Engineering)

More specifically:

- The Senate of the Foundation exercises the following responsibilities:
 - a. Approves the establishment of the Programme, following a recommendation from the Department Assembly, as well as the amendment of the decision to establish the Programme, following a recommendation from the Curriculum Committee
 - b. Approves the Internal Regulations of the Programme, following a recommendation from the Department Assembly, as well as its amendment, following a recommendation from the Curriculum Committee
 - c. Forms the Curriculum Committee of the Programme and appoints the Director of the Department of Education, upon recommendation of the Department Assembly
 - d. Approves the abolition of the Programme, upon recommendation of the Department Assembly
 - e. Exercises any other authority related to matters of academic, administrative, financial and organizational nature of the Programme, which are not specifically assigned by this document to other bodies.
- The Curriculum Committee of the Programme is composed of seven (7) members of the Teaching and Research Staff (T.E.P.) of the Schools of Chemistry, Physics and Mechanical Engineering, of which at least two (2) T.E.P. members are of the rank of Professor or Associate Professor. Specifically, it consists of three (3) members of the Teaching and Research Staff (T.E.P.) of the School of Chemistry, two T.E.P. members of the School of Physics and two (2) T.E.P. members of the School of Mechanical Engineering. The Committee has a four-year term and is established by decision of the Senate of the University, following a recommendation from the

Department Assemblies. The members of the Committee do not receive any compensation for the exercise of their administrative duties. The Curriculum Committee of the Programme exercises the following responsibilities:

- a.** Recommends to the Senate the amendment of the decision establishing the Programme, as well as any other matter related to its operation, for which the Senate is the competent body
- b.** Distributes the teaching work among the teachers of the Programme
- c.** Prepares the annual budget of the Programme
- d.** Approves all expenses for the operation of the Programme
- e.** Determines the successful completion of the studies, in order to award the title of Programme
- f.** Exercises any other responsibility related to the organization, administration and management of the Programme programme.

● The President of the Department of Chemistry (Coordinating) is appointed as Director of the Interdepartmental Foreign Language Undergraduate Study Programme in Materials Science and Engineering, with the aim of ensuring a unified strategic and administrative supervision and targeting of the Greek-language and foreign-language Study Programmes. The Director exercises, indicatively, the following responsibilities:

- a.** Chairs the Curriculum Committee and convenes its meetings
- b.** Recommends to the Curriculum Committee and the other bodies of the University issues related to the effective operation of the Programme
- c.** Is the Scientific Director of the Programme, in accordance with article 234 of Law 4957/2022.

4. Coordinator of the Foreign Language Undergraduate Study Programme. By decision of the Study Programme Committee, a Coordinator of the Programme may be appointed for a period of time equal to the term of office. The Coordinator is a member of the Faculty of one of the Schools of Chemistry, Physics and Mechanical Engineering and collaborates closely with the Programme Director and the Committee, undertaking coordination and organizational duties under their supervision. The Coordinator, upon assignment by the Study Programme Committee, exercises, indicatively, the following responsibilities:

- a.** Monitors the smooth daily operation of the Programme and ensures the timely implementation of the decisions of the Committee and the Director
- b.** Oversees the organization of the programme schedule and communication with teachers

- c. Collaborates with the Secretariat on issues related to the operation of the Programme
- d. Ensures that students are informed about the curriculum, evaluation procedures, mobility, scholarship opportunities and any other academic or administrative issue
- e. In coordination with the Programme Secretariat, prepares and submits regular reports to the Committee and the Director on the operation of the Programme
- f. Represents, following a relevant decision of the Committee or the Director, the Programme in administrative and/or academic contacts with bodies within and outside the A.U.T.H
- g. Exercises, upon authorization by the Committee, any other responsibility assigned to the Director by this Regulation.

4.4 Categories of Candidates in the Programme

Foreign candidates are eligible to apply if they are:

- a) Graduates of high schools or equivalent schools with a physical location abroad. Interested candidates, provided they have attended the last two (2) years of high school or equivalent school in a foreign country with full attendance, must present a high school diploma or other equivalent secondary education qualification, which entitles them to admission to higher education institutions in the country in which they graduated.
- b) Graduates of a recognized foreign school of other Member States of the European Union or third countries, which is legally established and operates in the country, whose title grants them the right to admission to higher education institutions established in the country whose educational curriculum is followed by the said foreign school of graduation, provided that:
 - ba') they and their parents do not have Greek citizenship and
 - bb') they have attended at least the last two (2) years 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 from the Programme.

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

The method of checking the authenticity of the high school diploma and the candidate's analytical score may be carried out:

- a. with a Hague seal (APOSTILLE), provided that the country of origin of the documents is a member of the Hague Seal Convention,
- b. with a notary's endorsement (notarial deed),
- c. with validation by the Ministry of Foreign Affairs and/or the Ministry of Education of the issuing country,
- d. by submitting the high school diploma and/or the detailed academic record and simultaneously informing the foreign school by the interested party. The information is accompanied by an official email from the foreign school, giving the Programme Secretariat the opportunity to verify the authenticity of the documents in question.

Proof of English language proficiency

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

- a. Native English speaker.
- b. Possession of a language proficiency certificate at least at level B2 from a recognized examination body, in accordance with the current decisions of the Supreme Personnel Selection Council (ASEP) or the Ministry of Education on recognized language proficiency qualifications.
- c. Degree from a Department of Foreign Language and Literature or a Department of Foreign Languages, Translation and Interpreting in Greece, or an equivalent degree from a recognized institution abroad.
- d. Bachelor's / Master's / Doctorate from a recognized university abroad, provided that the programme is conducted entirely in English.
- e. High school diploma, provided that the candidate has attended at least the last two (2) years of secondary education in a school where the official language of instruction is English.
- f. The foreign language proficiency permit does not constitute proof of knowledge of that language, as the presentation of a validated academic qualification on the basis of which the permit was issued, as well as its official translation, if required, is required.

4.5 Number of Admitted Students, Selection Criteria and Required Documents

The annual number of admissions to the Programme “Materials Science and Engineering” is set at a maximum of forty [40] undergraduate students, while the minimum number of admissions for the Programme to operate is set at twenty-one

(21) undergraduate students. Upon recommendation of the Curriculum Committee, and decision of the Senate and publication in the Government Gazette, the minimum and maximum number of admissions may be changed in each cycle of the Programme.

In the event of a tie among candidates, candidates who score the same as the last successful candidate are entered into the Programme, according to their merit ranking and until the maximum number (forty) is reached.

The selection of the admitted candidates is carried out on the basis of the candidates' CVs following an evaluation of the file and supporting documents by the Curriculum Committee and the candidates' participation in the selection process. This includes an oral interview conducted online by members of the Committee and assesses communication and reasoning skills, academic and personal readiness, and general understanding of issues related to science and materials engineering. By decision of the Curriculum Committee, which is mentioned in the announcement, a knowledge test in the English language may be conducted prior to the interview in the format and on topics that will be specified each time in the said announcement.

The relevant announcement and the corresponding required supporting documents are published on the programme's website every March.

Applications are accepted electronically throughout the year and until the available positions are filled. Prospective applicants are invited to submit their applications, accompanied by the necessary supporting documents, to the Programme Secretariat in electronic format. The English language proficiency test and interviews are conducted on predetermined dates set by the Programme Committee, while the evaluation order follows the chronological order of receipt of applications. The relevant announcement and the corresponding required supporting documents are published on the Programme website.

The candidate submits the following supporting documents:

- Application for participation in the Programme available in electronic form on the Programme website
- Photocopy of both sides of the Police Identity Card or Passport
- High School Diploma (with official translation into English)
- Detailed grades of all subjects of the last year of high school (with official translation into English) which must show that they have been successfully examined in Mathematics, Physics and Chemistry courses or as respectively described in the relevant certificate (graduation certificate).
- Certificate of English language proficiency at least level B2
- A covering letter (Motivation Letter) of up to five hundred (500) words, presenting the candidate's interest in materials science and engineering, the motivation for studying in the programme, and his/her future goals
- A short CV that includes information on studies, distinctions, volunteering or other activities related to the subject.

The above-described candidate selection criteria and supporting documents may be modified upon proposal of the Curriculum Committee and approval by the Senate of the Aristotle University of Thessaloniki.

In addition, the following optional academic criteria are positively considered in the evaluation of the candidate's file:

- Minimum overall baccalaureate grade: seventy percent (70%) of the maximum score or equivalent
- Possession of admission tests qualifications to higher education, such as:
 - International Baccalaureate (IB): at least 28/45,
 - GCE A-levels: at least ABB in 3 subjects, with particular emphasis on subjects related to the subject area of the programme
 - Advanced Placement (AP): Performance 4 or 5 in relevant subjects such as Chemistry, Physics, Mathematics
 - SAT / ACT: SAT: $\geq 1000/1600$ ACT: $\geq 25/36$
 - TSA (Thinking Skills Assessment): $\geq 60/100$ or raw score $\geq 25/50$

For the evaluation and selection of candidates, additional criteria are taken into account, which are defined and may be reformed upon the recommendation of the Curriculum Committee and in accordance with the applicable legal framework.

The relevant original documents, if deemed necessary, may be requested from the candidate to be sent by post or submitted in person to the Programme Secretariat.

The final selection process for candidates for the Programme is carried out by the Programme Committee, as follows: The Committee prepares a complete list of all candidates and, after the relevant review, rejects those who do not meet the minimum criteria set by the institutional framework and the Internal Regulations of the Programme and invites the qualified candidates who have collected the required supporting documents to an interview. After completing the process [the evaluation based on the supporting documents, the interview and the knowledge test (if any)], the final list of successful candidates is prepared.

The final list of successful candidates and any runners-up is validated by the Curriculum Committee. The selection process of candidates, the issuance of results and the registration of successful candidates must be completed by September 30 of each academic year, with the exception of filling vacancies arising from students who voluntarily withdrew from the Programme by interrupting their studies. The said positions are filled in order of priority from the list of runners-up drawn up by the Curriculum Committee during the evaluation of applications.

In addition and in addition to the above, students of higher education institutions abroad, who hold a certificate of evaluation of periods of study completed at a recognized higher education institution abroad (paragraph 1 of article 314A of law 4957/2022 as amended by article 128 of law 5094/2024), are provided with the opportunity to enroll in the Materials Science and Engineering Programme of the Aristotle University of Thessaloniki, in order to continue their studies and be awarded the corresponding degree.

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

Filling vacancies

In the event of a student's withdrawal or expulsion, the Curriculum Committee may, by its specifically justified decision, proceed to fill the vacant position, in order to ensure the smooth operation of the Programme by maintaining a stable number of students in each year of study.

The position can be filled by students studying in the same or a higher semester of studies at internationally recognized higher education institutions abroad.

The selection of candidates can be made either from candidates who had applied in the initial submission cycle, or through a separate public call.

Interested parties are requested to submit the following supporting documents:

- Copy of ID card or passport,
- High school diploma (original and official translation into English),
- Grades of all courses of the last year of High School (original and official translation into English),
- Detailed grades from the School of origin (in the cases of par. 1 of No. 314A of Law 4957/2022),
- Official Curriculum of the School of origin for verification of academic equivalence (in the cases of par. 1 of No. 314A of Law 4957/2022),
- Proof of English language proficiency in accordance with the relevant section of Article 4 of these Regulations,
- Letter of interest and
- Curriculum vitae.

The Committee evaluates the candidates' files and may invite them 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 request to the Secretariat of the Programme.

The registration of successful candidates takes place following a relevant announcement by the Secretariat of the Programme within fifteen (15) days, with the submission of any necessary supporting documents. In the event that a candidate does not register within the stipulated deadline by paying the relevant advance payment of tuition fees, it is considered a refusal to accept the position, which is filled by the next runner-up.

It is clarified that applications and the possible acceptance of candidates concern exclusively the academic year specified in the respective call for applications. Provisional admission is not provided for subsequent academic semesters or years, regardless of the reason, including, but not limited to, military service or personal obligations. Candidates who wish to study in a later year must re-apply for the next cycle and its corresponding call.

Exceptionally, the Curriculum Committee may, by its reasoned decision, approve the postponement of the start of studies for one academic year, provided that there are serious reasons sufficiently documented by the interested candidate. The relevant decision to grant or not the postponement is left exclusively to the discretion of the Committee.

4.6 Duration and Terms of Study at the Programme

The duration of study at the Programme “Materials Science and Engineering” in the 4-year version of the programme leading to a Bachelor of Science in Materials Science and Engineering is set at eight (8) academic semesters, full-time, and in the 5-year version of the programme leading to a Diploma with Integrated Master in Material Science and Engineering is set at ten (10) academic semesters, full-time. 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 opportunity to continue in the 5th year leading to a Diploma with Integrated Master.

The programme of each semester course lasts thirteen (13) weeks and is developed with lectures, laboratory exercises, assignments, etc., depending on the requirements of the course and the choice of the individual instructor.

All courses are held in person, utilizing the infrastructure of the Schools of Chemistry, Physics and Mechanical Engineering. The exceptional use of modern distance learning methods is foreseen for the provision of teaching work carried out with the participation of Professors from foreign institutions or Collaborating Professors, in force majeure or extraordinary circumstances, where it is not possible to conduct the educational process in person or to use the infrastructure of the Schools of Chemistry, Physics and Mechanical Engineering for the conduct of its educational, research and other activities and for the organization of in-depth courses and tutorial exercises, in addition to the mandatory teaching hours per course. Distance learning courses are

conducted using 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 (DGU) of the Aristotle University of Thessaloniki.

The minimum duration of study at the Programme for the award of the degree is 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 versions of the programme respectively.

After completing the maximum duration of study of fourteen (14) and sixteen (16) semesters, and without prejudice to the provisions that apply each time in accordance with the current legislation on HEIs, a student's expulsion certificate is issued by the competent body of the Programme

Once registration has been completed and all the prescribed procedures concerning the formally guaranteed commencement of studies have been completed, students who have not exceeded the maximum study limit of par. 1 may request a suspension of studies for a period not exceeding a total of two (2) academic years. The right to suspend studies may be exercised once or in parts for a period of at least one (1) academic semester, but the duration of the suspension may not exceed a cumulative two (2) years if granted in parts. Student status is suspended at the time of suspension of studies and participation in any educational process is not permitted. The period of interruption of studies is not counted towards the maximum duration of regular studies, while upon resumption of studies, students return to a state of regular studies with all the rights and obligations provided for in the Programme. The relevant procedure is initiated by a written application from the interested student to the Secretariat of the Programme, accompanied by the necessary, if applicable, documents and is evaluated by the Curriculum Committee.

For serious health reasons attributable to the student or a first-degree relative by blood or spouse or a person with whom the student has entered into a cohabitation agreement, the maximum duration of study may be exceeded by an exception of one (1) year. This exceedance is approved by the Curriculum Committee, following a fully justified and sufficiently documented application by the student, and may not exceed two (2) consecutive academic semesters.

The Programme does not offer the possibility of part-time study.

For issues of re-examination of courses in due courses or deletion for reasons such as:

- a)** the student's insufficient progress (which is documented by lack of participation in the educational process: attendance, exams),
- b)** the manifestation of behavior that offends academic ethics and
- c)** the student's own request,

the Curriculum Committee decides.

4.7 Student Rights and Obligations

Within the framework of the social policy of the Schools of Chemistry, Physics and Mechanical Engineering, in collaboration with the Equal Access Unit of the Aristotle University of Thessaloniki, the full, equal and meaningful participation of all students with disabilities or special educational needs in all educational, research and administrative activities of the School in general and of the Programme in particular 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 register and participate in the Programme under the terms and conditions provided for in this Regulation. Students of the programme have all the rights, benefits and facilities provided for students of the Greek-language study programme, except for the right to free textbooks. Also, meals at the University Student Club of the Aristotle University of Thessaloniki are provided for a small fee, as determined by the Club's operating regulations.

Students admitted to the Programme must:

- 1.** Attend all courses of the Study Programme, regardless of whether they are conducted in person or, exceptionally, remotely, provided that the latter has been approved by the competent bodies of the Programme. Participation in courses, exercises, exams, public lectures and other educational activities is mandatory. Students are entitled to an absence of up to thirty percent (30%) of the total teaching hours of each course per semester. In the event of a serious and justified impediment, it is possible to make up the teaching hours, after consultation with the instructor and with the approval of the Study Programme Committee.
- 2.** Submit the required assignments on time, provided that they are provided for in each course by the responsible instructor.
- 3.** To declare in a timely manner the courses of previous years that have not been successfully examined, at the beginning of each semester. The declarations are registered electronically through the electronic secretariat service and are included in the student's individual portion. A mandatory declaration is required in the last year for elective courses.
- 4.** To procure or borrow the necessary textbooks, based on those proposed by the person responsible for each course, if this is deemed necessary.

- 5.** To systematically monitor the announcements of the Programme and the Secretariat, regularly checking their electronic mail.
- 6.** To issue an academic identity card through the competent electronic service of the Ministry of Education, Religious Affairs and Sports.
- 7.** To pay tuition fees on time before the winter (1st) and spring (2nd) semesters of each academic year, according to the deadlines set.
- 8.** To have settled any financial or other outstanding matters with the Programme and the Foundation before their graduation. Otherwise, they are not entitled to participate in the ceremony of receiving their degree.
- 9.** In the case of a scholarship with a rewarding nature, to provide the foreseen work, which may concern the support of the educational or research function of the Programme, the library or other needs of the School.
- 10.** To respect the decisions of the Programme bodies and to observe 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 student's expulsion from the Programme, following a decision by the Curriculum Committee.

The same sanction 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 areas, as well as any action that is contrary to the principles of respect, equality and inclusion. Finally, the Committee reserves the right to refer the relevant cases to the competent disciplinary bodies of the Institution or, if appropriate, to forward them to the competent authorities of the legal system, in accordance with applicable legislation.

The Schools of Chemistry, Physics and Mechanical Engineering of the Aristotle University of Thessaloniki provide the institution of the Academic Advisor. The role of the Academic Advisor is to advise students on the successful completion of their studies and, based on their individual goals, to propose guidance and solutions for any problems that arise and prevent the successful completion of their studies. The list of Academic Advisors is announced by the Secretariat on the Department's website with contact details. All members of the Faculty and the Academic Advisory Board are required to perform the duties of an Academic Advisor and the appointment is made after the registration of new students, at the beginning of each academic year. New students should contact the Academic Advisor assigned to them directly at the beginning of the winter semester of the year of admission to the Department. They are then encouraged to maintain at least one communication per semester with the respective Academic Advisor. The Academic Advisor is committed to suggesting solutions in the event that a student faces a problem related to the smooth monitoring

of his/her studies, in accordance with the Department's study regulations and the broader regulations of the Aristotle University of Thessaloniki, and also to respect personal data in accordance with the code of ethics.

4.8 Curriculum - Course Contents - Knowledge Test

The **Joint Undergraduate Program of Studies in English (JEUPS)** "Materials Science and Engineering" offers a full-time study guide, with the possibility of electives, lasting four (4) and five (5) academic years, which is structured into eight (8) and ten (10) academic semesters respectively. The programme includes fifty-eight (58) courses in total, of which forty (40) are Compulsory and eighteen (18) Compulsory Direction courses. The distribution of courses is, as a very 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 pass forty (40) compulsory courses, from which he will accumulate two hundred and thirty-four (234) credit units (ECTS) during his studies. The compulsory courses aim to provide the student with the fundamental knowledge and methodology of the subjects that traditionally compose the core of Materials Science and Engineering around the world.

Mandatory Direction (MD) courses in the case of a five-year integrated cycle of studies. Three (3) directions are offered (Materials Manufacturing and circular economy, micro and nanotechnology engineering, Biomaterials and Biotechnology) with eighteen (18) compulsory direction (MD) courses, of which the student must choose to attend during the seventh (7th) and eighth (8th) semesters of studies, three (3) courses per semester, two (2) per semester from the direction he has chosen and one (1) per semester from any other direction and in any combination he wishes, so that, having successfully passed six (6) courses in total, he will accumulate an additional thirty-six (36) credit units (ECTS) during his studies. Direction (MD) courses aim to introduce the student, at his choice, to the logic of more specialized cognitive subjects. In the ninth (9th) and tenth (10th) semesters, the student will prepare a thesis from which he will accumulate 30 ECTS, and a total of 300 ECTS. Successful completion of the Programme corresponds to three hundred (300) credit units (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 complete cycle of studies. The student is required to attend and successfully pass thirty-four (34) compulsory courses, from which he will accumulate two hundred and four (204) credit units (ECTS) during his studies. In the fourth year, the three (3) directions are offered with eighteen (18) direction courses (MD) as in the 5-year cycle of studies, of which the student must choose to attend three courses in the seventh (7th) and one (1) in the eighth (8th), so that, having successfully passed them, he will accumulate a total of twenty-four (24) ECTS during his studies. In the eighth (8th) semester, the student will prepare a thesis from which he will accumulate 12 ECTS, and a total of 240 ECTS. Successful completion

of the Programme corresponds to two hundred and forty (240) credit units (ECTS). The only difference is that in the 8th semester, instead of choosing three (3) specialization courses, from the direction they have chosen, students choose 1 specialization course and have the opportunity to do a thesis.

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

Teaching is carried out in person, with the provision of the use of digital support for educational material and communication between students and teachers through the e-learning platform of the Aristotle University of Thessaloniki. Attendance at classes 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. Successful completion of studies for the award of the title requires the accumulation of three hundred (300) ECTS for the five-year (5) cycle of studies and the accumulation of two hundred forty (240) ECTS for the four-year (4) cycle.

The language of instruction for all courses is English. Students have access to optional Greek terminology courses, especially in the fourth (4th) year, aimed at facilitating those who wish to continue their professional careers in Greece, as well as courses of special interest. The programme does not provide for mandatory internships, however, advisory support and opportunities to participate in research projects are offered and it gives those who wish the opportunity to participate in international mobility programmes.

Study programme

Code	CURRICULUM Mandatory Courses	Hours/week	ECTS
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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
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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
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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	<i>Fundamentals of Additive Manufacturing</i>	4	6
MSEN 712	<i>Powder metallurgy</i>	4	6
MSEN 713	<i>Materials Circular Economy and LCA</i>	4	6
Area 2: Micro and Nanotechnology Engineering			
MSEN 721	<i>Surfaces and Interfaces and Thin-Film Materials Science</i>	4	6
MSEN 722	<i>Nanomaterials and Nanotechnologies</i>	4	6
MSEN 723	<i>Fundamentals of Semiconductor Materials</i>	4	6
Area 3: Biomaterials and Biotechnology			
MSEN 731	<i>Bio- organic materials</i>	4	6
MSEN 732	<i>Biochemistry Theory and Laboratory</i>	4	6

MSEN 733	<i>Bio inorganic materials for biomedical and clinical applications</i>	4	6
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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	<i>Waste Valorization and Advanced Recycling Technologies</i>	4	6
MSEN 813	<i>Critical raw materials</i>	4	6
Area 2: Micro and Nanotechnology Engineering			
MSEN 821	<i>Optoelectronics and Sensors: Materials and Applications</i>	4	6
MSEN 822	<i>Materials and systems in Energy Technologies</i>	4	6
MSEN 823	<i>Electronic Materials Processing</i>	4	6
Area 3: Biomaterials and Biotechnology			
MSEN 831	<i>Bio-inspired Engineering</i>	4	6

MSEN 832	<i>Biomechanics</i>	4	6
MSEN 833	<i>Structural Biochemistry and Bioinformatics</i>	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

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Course content

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 programme, 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 near-surface 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 - Knowledge testing - Student evaluation

The Programme is taught with the physical presence of teachers and students in the classrooms. By decision of the Curriculum Committee, a weekly online education zone may be established, common to all Programme students, which will be used to conduct tutorial and/or seminar courses and, exceptionally, for course replacements in cases where classrooms are not available for this purpose on other days of the week. In exceptional cases of dealing with extraordinary circumstances that prevent in-person teaching, it may, by a specially justified decision of the Dean of the School and Director of the Programme, be conducted online for a limited period of time, which is necessary in order to address the extraordinary circumstances that justify the transition to distance learning in the short term.

Similarly, examinations are conducted with the physical presence of students and examiners in the School's classrooms, whether they are conducted in writing or orally. As an exception, oral examinations may be conducted remotely, provided that the identification of the examinees is ensured and the best practices for conducting oral examinations via the internet are observed, in order to ensure their integrity. The conduct of written examinations remotely is not permitted, except in the cases and under the conditions mandatorily provided for by applicable legislation. By decision of the Curriculum Committee, written examinations may be conducted using a tablet, laptop or PC, provided that they are conducted with the physical presence and supervision of the examinees in the School's classrooms, under the guarantees of a comprehensive plan for conducting these examinations, which will ensure their integrity and equal treatment of the examinees.

Attendance at classes, tutorials and any other organized educational activity of the Interdepartmental Foreign Language Undergraduate Programme is mandatory. Students may be absent up to thirty percent (30%) of the total teaching hours of each course per semester, while deviations from this limit are permitted only in exceptional cases, upon approval by the Programme Committee. Regular participation in lectures, tutorials and exams is considered an essential element of academic performance for the successful progress of students in the Programme.

Before the start of each semester, the Secretariat of the Programme prepares and publishes the detailed teaching timetable for the semester, taking care that, as far as possible, the compulsory courses and elective courses (a) are distributed evenly across

all days of the week, (b) that there is not a long time gap between the courses during the same day on which they happen to be taught and (c) that they do not coincide with the teaching of other courses **C** or **D** of the same semester of studies.

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

Student evaluation

1. Students of the School's Programme are evaluated by written or oral exams, which are held at the end of the semester for the courses taught in the same semester and by taking into account any other work or midterm exam and grade weighting, as specified in the description of each course. All courses are examined during the September re-examination period. The student's participation in an oral exam excludes his participation in the written exams of the same course during the same examination period.

2. The teacher must provide one (1) grade at the end of each examination in which are taken into account: the student's performance during the teaching of the course (continuous control 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 in a percentage to be determined by the instructor.

3. The instructors take special care for the oral examination of students with dyslexia proven before their admission to the Programme or with serious motor problems or vision problems that significantly hinder their participation in written exams, according to a procedure defined in the applicable provisions.

4. The Programme Secretariat publishes in a timely manner the detailed schedule of the written exams of the upcoming examination period. Under the responsibility of the instructors, assisted by the Secretariat of the Programme, a sufficient number of invigilators from doctoral candidates and postgraduate students is ensured. The instructors must be constantly present at the examination venues, supervise their smooth and unimpeded conduct and take the necessary measures for these purposes.

5. Each examinee must check, before coming to the specific examination, the entry of his name in the Secretariat's computerized list of those entitled to participate in the examination of the specific course. Examinees are prohibited from copying or falsifying in any other way the result of the examination procedure, as well as 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 procedure constitutes a particularly aggravating case against the examinee. Furthermore, examinees are prohibited from using a separate sheet as a draft. For this purpose, they are allowed to use the last page of their written

examination. In case of violation of these conditions, the written test will be nullified as an internal order measure to ensure the integrity of the examination process, without prejudice to any other sanction that may be imposed in accordance with the applicable provisions.

6. The designated invigilators must check the academic ID card that proves the student status and certifies the identity of the examinee, verify that the student's name and special registration number are written on his/her written examination paper, initial each written examination paper, supervise the examinees so that they do not copy or talk to each other, constantly supervise the entrances and exits of the room, especially at the end of the examination time and the delivery of the written examination papers, and ensure that no examinee leaves or leaves the examination room before thirty minutes (30') have passed since the distribution of the subjects.

7. The written examination of each course lasts for a maximum of two (2) hours for all courses.

8. After the submission of the written tests, the supervisors count the written tests they received and one of them confirms the number of written tests that have been received. The written tests are then handed over to the instructor, who counts them and confirms with his signature before the supervisor the number of written tests received.

9. Instructors must submit to the Programme Secretariat the results of the final examinations, written and/or oral, uniformly on the same grade sheet for each course, no later than twenty-five (25) days from the day each examination was held. For oral examinations, the instructor is not allowed to announce the result of the examination to the examined students, but only collectively for all those examined, in writing and/or orally, at the end.

10. In all courses of the Programme, the result of the student's knowledge test is expressed numerically with points from zero (0) to ten (10). In the grades, failure is marked with points from zero (0) to four (4) and success with points from five (5) to ten (10).

11. It is not permitted to publish exam results in any way with the names of the examinees visible, except by citing their special registry number (AEM).

12. The transfer of a student's grade from one examination period to the next is permitted. Clauses that may be written on the examinees' transcripts and concern their desire to be dropped if they are evaluated with a grade lower than desired, or references regarding how many courses one owes to obtain a degree, are not permitted and if written, are not taken into account.

13. The answers to the questions of the written examinations, practical and theoretical, are discussed after the results are issued by the teachers with the interested students at specially designated times, and the examinees have the right to see their transcript - of the current examination period at any time - and to request

explanations for the way in which it was evaluated. The teachers are obliged to post the proposed solutions to the practicals they took in the examinations in the e-learning of their course.

4.9 Scholarships

Within the framework of the Interdepartmental Foreign Language Undergraduate Study Programme, the possibility of awarding scholarships to students is provided, based on academic and objective criteria and following a decision by the Study Programme Committee. Indicatively:

- Up to three (3) scholarships per academic year are available to students who stand out during the selection process, based on the overall evaluation of their qualifications (including the results of the oral interview), and who were ranked among the first to enter 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 of the following academic year may be awarded to the student who accumulates the highest average performance score in all courses of each year, provided that he has successfully completed all courses within the prescribed time. In case of a tie, the scholarship may be awarded to more than one student.
- The Curriculum Committee may award excellence awards to students who demonstrate exceptional performance during their studies. The awards may be accompanied by an honorary distinction and/or a cash prize. In particular, at the end of each academic year, a first-year student award may be awarded, based on overall performance in all courses and consistency in attendance. Correspondingly, an excellent graduate award may be awarded to the student with the highest academic performance during the course of study.
- A full or partial exemption from the payment of tuition fees may be provided, following a reasoned decision of the Curriculum Committee, for students who come from war zones or are under international or subsidiary protection, based on documented social and humanitarian criteria.
- In exceptional cases, a social scholarship may be granted to candidates or students of the Programme who are facing serious financial difficulties, health issues, loss of a parent, or are living under a state of emergency or long-term crisis, after examination of the relevant application and the accompanying supporting documents by the Study Programme Committee.
- The possibility of granting reciprocal scholarships is also provided, which consist of an exemption from paying part of the tuition fees, with the obligation of the student to offer specific work in support of the Programme. This work may include assistance

in the library, support of administrative functions, assistance in research projects or other activity to be determined by the Study Programme Committee, in consultation with the Secretariat and the members of the Faculty. The duration and content of the reciprocal scholarship are clearly specified when it is awarded, while failure to comply with the obligations may lead to its revocation.

The awarding of the above-mentioned scholarships and/or awards of excellence, the specific conditions of award, the obligations and rights of the scholarship holders are determined following a decision of the Study Programme Committee and are at its sole discretion based on the financial capabilities of the Programme and its cash reserves.

4.10 Teaching Staff of the Programme

The teaching work of the Programme is distributed by decision of the Curriculum Committee to teachers with a subject area related to the subject of the teaching work assigned to them. By decision of the Curriculum Committee, the teaching staff is assigned the teaching of the courses of the Programme of the next academic year. Specifically, the following may be employed as teaching staff of the Programme:

- a.** members of the Teaching and Research Staff, of the Departments of Chemistry, Physics and Mechanical Engineering or other Departments of the A.U.T.H. or another Higher Educational Institution (HEI) with additional employment beyond their legal obligations as defined in the applicable legislation,
- b.** Emeritus Professors or retired Teaching and Research Staff members of the Schools of Chemistry, Physics and Mechanical Engineering or other Departments of the A.U.T.H. or another HEI,
- c.** members of Special Educational Staff, Laboratory Teaching Staff and Special Technical Laboratory Staff of HEIs, who hold a doctoral degree and have teaching experience, as well as sufficient scientific, writing or research activity,
- d.** appointed lecturers,
- e.** visiting professors and visiting researchers,
- f.** contract researchers,
- g.** researchers and special operational scientists of the research centers of article 13A of Law 4310/2014 (A' 258) or other research organizations in Greece and abroad, who hold a doctoral degree and have teaching experience and sufficient scientific, writing or research activity,
- h.** postdoctoral fellows and young scientists, holders of at least PhD, who have specialized knowledge or relevant experience in the subject area of the Programme,

i. collaborating professors.

The assignment of the teaching work of the Programme is carried out by decision of the Curriculum Committee, following a recommendation by the Programme Director who collaborates for this purpose with the Chairs of the participating Schools. The decision of the Curriculum Committee ensures that the teaching and general educational activities assigned to faculty members of the participating Schools within the framework of Programme do not in any way affect their other educational, research and administrative obligations towards the Schools of the Greek-speaking Undergraduate Study Programmes.

The decision of the Curriculum Committee on the assignment of teaching work is issued no later than the beginning of each academic semester and must include the teachers of the Programme, the courses, the educational activities and the total teaching hours assigned per teacher according to the curriculum per academic semester, as well as the total cost of their remuneration, if the payment of remuneration is foreseen and is notified without delay to the Special Account for Research Funds (ELKE) of the Aristotle University of Thessaloniki. All categories of teaching staff are remunerated exclusively from the resources of the Programme, if their remuneration is foreseen. The amount of remuneration per category of teaching staff is determined following a decision of the Curriculum Committee and in accordance with the rules governing the ELKE. regarding contracts for remuneration of Foundation staff, external collaborators, the exercise of additional teaching work and the total number of teaching hours assigned per case.

The obligations of teachers include, among other things, the description of the course or lectures, the method of examining the course, as well as the communication with students necessary for the academic purposes of the programme.

It is the obligation of teachers to adhere to the weekly teaching schedule in accordance with the course timetable, as drawn up and determined by the Committee, and to follow the examination and evaluation conditions, as described in this Regulation.

4.11 Programme Revenue - Tuition Fees - Financial Management Process

The resources of the Materials Science and Engineering Programme of the Schools of Chemistry, Physics and Mechanical Engineering of the Aristotle University of Thessaloniki may come from:

- a. tuition fees,**
- b. donations, sponsorships and all kinds of financial aid,**
- c. bequests,**

d. resources from research projects or programmes, especially from the European Union,

e. own resources of the Aristotle University of Thessaloniki, the amount of which cannot exceed five percent (5%) of the total budget of the Programme and

f. any other legitimate reason.

Tuition fees

For studying at the Programme, a total tuition fee of forty thousand euros (40,000€) is paid, divided into eight thousand euros (8,000€) per academic year. The amount of tuition fees is defined and amended by decision of the Senate of the A.U.Th., while the method and time of payment may be adjusted by decision of the Curriculum Committee.

The payment of tuition fees is made by the students themselves (or by a third natural or legal person on their behalf) to a bank account held by the ELKE A.U.Th., in ten (10) equal installments of four thousand euros (4,000€): the first installment during the student's registration process in the Programme and the subsequent ones before the start of each semester. After the payment of the tuition fees, the corresponding document is issued and the student is informed electronically.

Payment is made electronically, according to the instructions sent with the confirmation of receipt of the application. The amount is deposited with the ELKE A.U.Th. and is not refunded in case of non-acceptance or withdrawal of the application.

In case of acceptance of the position in the Programme, candidates are asked to pay an additional amount of one thousand euros (1,000€) as a tuition fee deposit. This amount is also paid to the ELKE A.U.Th. and is not refunded in case of withdrawal from the programme.

Financial Management Process

The management of the resources of the Programme, with the School of Chemistry in collaboration with the School of Physics and the School of Mechanical Engineering, is carried out by the Curriculum Committee through the Special Account for Research Funds (ELKE) of the A.U.Th. and are allocated on a priority basis to cover the operational needs of the Programme and, if there are cash reserves, these may be allocated to cover other educational and development needs of the Schools of Chemistry, Physics and Mechanical Engineering. By decision of the Board of Directors, following a recommendation from the ELKE Research Committee, the retention percentage in favor of the ELKE of the A.U.Th. is determined.

The operating expenses of the Programme also include the fees of teachers and visiting professors. The amount of the fee per category of teaching staff is determined by the Curriculum Committee, in accordance with the Remuneration Regulation of the ELKE A.U.Th. and up to the maximum permitted limit per teaching hour. The Committee may decide on the graduated differentiation of fees, depending on the number of admitted students per academic year.

Furthermore, the operating expenses of the Programme also include travel expenses incurred for the needs of the organization and operation of the Programme and approved by the Programme Committee. Travel expenses are borne by the Programme budget and are paid to the travelers after the presentation of the relevant documents, in accordance with article 248 of Law 4957/2022 and subsequent relevant amendments.

The resources of the Programme are distributed as follows:

- a.** an amount corresponding to ten percent (10%) of the total income derived from tuition fees is withheld by the ELKE for the financial management of the Programme. By decision of the Board of Directors, it is decided whether the remaining amount, if it arises after deducting the withholding in favor of ELKE, is transferred to the regular budget or allocated for the creation of projects/programmes through the ELKE A.U.Th. with the aim of covering, as a priority, the needs of the Greek-speaking Undergraduate Study Programme of the Schools of Chemistry, Physics and Mechanical Engineering, which operate without tuition fees, as well as covering the research, educational and operational needs of A.U.Th. From the income of the Programme of paragraphs b) to d) of Article 11, the withholding in favor of ELKE which applies to income from corresponding sources of financing,
- b.** the remaining amount of the total income of the Programme is allocated to cover the operating expenses of the Programme.

4.12 Administrative Support - Logistics Infrastructure

The Foreign Student Support Unit is responsible for supporting foreign students of the Greek Higher Education Institution, based on article 212 of Law 4957/2022. The mission of the Foreign Student Support Unit is to support foreign students enrolled in first, second and third cycle study programmes of the HEI. Specifically, the responsibilities of the Foreign Student Support Unit are:

- a.** Supporting foreign students in their registration in foreign language study programmes of the Aristotle University of Thessaloniki
- b.** Supporting foreign students in the issuance of an entry visa and residence permit in Greece for study purposes and communicating with the competent State bodies on these issues

- c. Supporting the procedure for concluding contracts for the rapid granting of residence permits for study purposes, in accordance with article 37 of Law 4251/2014 (A' 80)
- d. Supporting students during their settlement in Greece
- e. Cooperating with the co-competent services of the Aristotle University of Thessaloniki to serve foreign students
- f. Ensuring the organization of Greek language or other foreign language courses in collaboration with the competent units of the Aristotle University of Thessaloniki
- g. The exercise of any other responsibility specified in the Organization of the HEI and related to the purpose of the Foreign Student Support Unit.

Administrative Support of the Programme

The School of Chemistry (Coordinating) of the Aristotle University of Thessaloniki, having extensive experience in the organization and implementation of first, second and third cycle study programmes, undertakes the overall administrative and technical support of this Interdepartmental Foreign Language Undergraduate Study Programme. The secretarial support of the Programme is provided by the Secretariat of the Programme, which may be staffed by personnel from the Secretariat of the School of Chemistry, constituting the main operational arm of its administration and operating under the supervision of the Curriculum Committee.

More specifically, the Programme Secretariat:

- a. Provides administrative support to the Committee and the Director of the Programme
- b. Handles the issues of the educational life cycle of students, from registration to graduation and the issuance of their degree
- c. Maintains the protocol, the printed and digital archive of the Programme
- d. Handles the administrative procedures concerning the teaching staff of the Programme (contracts, travel, etc.)
- e. Collaborates with the Special Account for Research Funds of the Aristotle University of Thessaloniki for the financial management of the Programme and the support of the relevant procedures.

The coordination of the Secretariat of the Undergraduate Studies Programme, as well as the observance of the minutes of the Programme Committee, is undertaken by an

executive of the Secretariat of the Greek-Language Undergraduate Studies Programme, who possesses the formal qualifications to exercise the duties of Head, in accordance with article 1 of Law 3839/2010. The relevant assignment is made by decision of the Undergraduate Studies Programme Committee.

In this context, to support the needs of the Programme, the following may be employed, in accordance with article 104 of Law 4957/2022:

a. Members of the regular administrative staff of A.U.Th., with additional employment beyond their legal obligations, following a decision of the Research Committee of ELKE, following a recommendation of the Committee of the Programme

b. additional staff, which is selected in accordance with the procedure of article 243 of L. 4957/2022.

The cost of remuneration for all categories of personnel is borne exclusively by the Programme budget.

Technical support for the operation of the programme is ensured centrally by specialized staff of the Digital Governance Unit of the Aristotle University of Thessaloniki, the existing technical staff of the General Directorate of Technical Services and Computerization of the Aristotle University of Thessaloniki and the technical staff of the School of Sciences.

For the implementation of the teaching of the courses of the Programme, the existing building and logistical infrastructure of the participating Departments of Aristotle University of Thessaloniki is used.

4.13 Type of Degree Awarded

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

The degree/diploma is issued by the Secretariat of the School of Chemistry. It is inscribed and co-signed by the Schools of Chemistry, Physics and Mechanical Engineering and the Institution, the emblem of the Aristotle University of Thessaloniki, the date of completion of studies, the date of issue of the degree, the graduation protocol number, the title of the Programme, the grade of the degree/diploma, the student's details and the evaluation classification: Good, Very Good, Excellent.

The graduate may be granted, prior to the award, a certificate of successful attendance and completion of the Programme.

In addition to the Degree, a Diploma Supplement is also issued, in accordance with article 15 of Law 3374/2005 and Ministerial Decision Φ5/89656/B3/13-8-2007 (Government Gazette 1466/B'). The Diploma Supplement is an explanatory

document, which provides detailed information regarding the nature, level, content, educational framework and legal status of the studies successfully completed. It does not replace the official degree or the detailed score issued by the Institution.

4.14 Method for Calculating the Final Degree/Diploma Grade

For the **calculation of the final degree grade** for the **five-year cycle of studies** and the composition of the courses listed in it, the following are taken into account:

- **Forty (40) mandatory courses**, which are required for the accumulation of **two hundred and thirty-four (234) ECTS credits** from **mandatory direction Courses (C)**,
- **Six (6) elective courses (E)**, required for the accumulation of **thirty-six (36) ECTS credits**, and
- the **Diploma Thesis**, which is carried out over **two semesters** and awards **thirty (30) ECTS credits**.

In total, the five-year program corresponds to **three hundred (300) ECTS credits**.

Correspondingly, for the **calculation of the final degree grade** for the **four-year cycle of studies** and the composition of the courses listed in it, the following are taken into account:

- **Thirty-four (34) mandatory courses**, required for the accumulation of **two hundred and four (204) ECTS credits** from **mandatory direction urses (C)**,
- **Four (4) elective courses (E)**, required for the accumulation of **twenty-four (24) ECTS credits**, and
- the **Diploma Thesis**, which awards **twelve (12) ECTS credits**.

In total, the four-year program corresponds to **two hundred and forty (240) ECTS credits**.

The **final degree/diploma grade** is calculated as the **weighted average of the grades obtained in the courses and the diploma thesis**, with the **corresponding ECTS credits used as weighting factors**.

Certification - Evaluation of the Programme

After the issuance of the decision to establish a Programme and before its commencement of operation, the certification of the Programme by the Hellenic Authority for Higher Education (HAHE) is required, in accordance with sub-paragraph c) of paragraph 1 of article 8 of law 4653/2020 (A' 12). After their establishment, the Programme are certified periodically, in accordance with sub-paragraph bb) of paragraph b) of paragraph 1 of article 8 of law 4653/2020, in the context of the evaluation of the academic unit to which they belong.

The Programme is evaluated in the context of the periodic evaluation/certification of the academic unit by the National Higher Education Authority. In particular, the overall assessment of the work carried out at the Programme, the degree of fulfillment of the objectives set at its establishment, its sustainability, the absorption of graduates in the labor market, the degree of its contribution to research, its internal evaluation by graduates, the feasibility of extending its operation, as well as other data regarding the quality of the work produced and its contribution to the national strategy for higher education are evaluated.

If the Programme during its evaluation stage is deemed not to meet the conditions for continuing its operation, its operation is completed with the graduation of the already registered students in accordance with the decision to establish it.

Internal Evaluation of the Quality Assurance Unit (MO.DI.P.)

In order to ensure and improve the quality of the Programme, the Quality Assurance Unit of the Aristotle University of Thessaloniki (MO.D.I.P.-A.U.Th.) conducts a periodic internal evaluation of the Programme within the framework of the Institution's Internal Quality Assurance System and in accordance with the instructions and guidelines of the Hellenic Authority for Higher Education.

The obligations of the administrative bodies and teachers of the programme also include all the procedures provided for, based on the respective instructions and guidelines of the MODIP-AUTH. for the internal and external evaluation and certification of the Study Programmes and Academic Units.

Evaluation of teachers and courses by students

With the sole purpose of improving the level of studies of the Programme and with absolute assurance of their anonymity, students are invited to evaluate the courses and teachers of each semester.

For reasons of uniform maintenance of statistical data and the possibility of extracting conclusions that can be used for the educational work of the Schools, Departments and the Institution as a whole, the evaluation questionnaires are prepared by the MODIP and can be partially differentiated, based on the particular characteristics and needs of each academic unit and/or each course. They are completed electronically.

The evaluation is carried out under the responsibility of the Internal Evaluation Team of the Programme which consists of three (3) faculty members of the School of Chemistry, two (2) faculty members of the School of Mechanical Engineering and two (2) faculty members of the School of Physics in collaboration with MODIP-AUTH, and is carried out through the latter's Quality Management Information System. The Administration and the Internal Evaluation Team of the School must take systematic

actions for the participation of students in the evaluation, in accordance with the directions of the Internal Evaluation Team and the relevant decisions of the Senate.

The Internal Evaluation Team of the Programme monitors, through MODIP's Quality Management Information System, the degree of participation of students in the evaluation process, analyzes the relevant results and informs the administrative bodies of the Programme and the corresponding academic unit. The evaluation questionnaires concern the respective course taught and the respective lecturer separately.

The administrative bodies of the Programme and the academic unit, in collaboration with the respective Internal Evaluation Team of the Programme, are required to study the results of the evaluation, announce their conclusions, decide on the publication of the summary results of the evaluation, when deemed necessary and in any case after the announcement of the semester's course grades, in accordance with the applicable Legislation for the protection of Personal Data, and undertake actions to address any problems or improve the Programme.

Teaching Staff

The table below shows the lecturers who have been selected based on their subject area and the courses they will teach. It should be noted that for 35% of the hours in all courses of the Programme, lecturers of categories 6 and 8 of section 6.9 will be hired, for whom a call for expressions of interest will be issued by the ELKE A.U.Th.

Teaching Staff – List of Names

A/A	School	Surname	Name	Rank	Employment Relationship
1.	Chemistry	Avranas	Antonios	Professor	Faculty Member
2.	Chemistry	Axilias	Dimitrios	Professor	Faculty Member
3.	Chemistry	Giannakouros	Thomas	Professor	Faculty Member

4.	Chemistry	Dendrinou Samara	Aikaterini	Professor	Faculty Member
5.	Chemistry	Zografos	Alexandros	Professor	Faculty Member
6.	Chemistry	Karapanagiotis	Ioannis	Professor	Faculty Member
7.	Chemistry	Karapantsios	Thodoris	Professor	Faculty Member
8.	Chemistry	Kostoglou	Margaritis	Professor	Faculty Member
9.	Chemistry	Lykakis	Ioannis	Professor	Faculty Member
10.	Chemistry	Nikolakaki	Eleni	Professor	Faculty Member
11.	Chemistry	Papageorgiou	George	Professor	Faculty Member
12.	Chemistry	Sarli	Vassiliki	Professor	Faculty Member
13.	Chemistry	Tsiplakidis	Dimitris	Professor	Faculty Member
14.	Chemistry	Psomas	George	Professor	Faculty Member
15.	Chemistry	Chatzidimitriou	Antonis	Professor	Faculty Member

16.	Chemistry	Aggaridis	Panagiotis	Associate Professor	Faculty Member
17.	Chemistry	Katsounaros	Ioannis	Associate Professor	Faculty Member
18.	Chemistry	Koukaras	Manolis	Associate Professor	Faculty Member
19.	Chemistry	Lazaridis	Thodoris	Associate Professor	Faculty Member
20.	Chemistry	Nikolaidis	Nikolaos	Associate Professor	Faculty Member
21.	Chemistry	Gkizis	Petros	Assistant Professor	Faculty Member
22.	Chemistry	Kalogiouri	Natassa	Assistant Professor	Faculty Member
23.	Chemistry	Kartsonakis	Ioannis	Assistant Professor	Faculty Member
24.	Chemistry	Balaskas	Andronikos	Assistant Professor	Faculty Member
25.	Chemistry	Binas	Vassilios	Assistant Professor	Faculty Member
26.	Chemistry	Papi	Rigini	Assistant Professor	Faculty Member
27.	Chemistry	Pournara	Anastasia	Assistant Professor	Faculty Member

28.	Chemistry	Trogadas	Panagiotis	Assistant Professor	Faculty Member
29.	Chemistry	Fanourgakis	George	Assistant Professor	Faculty Member
30.	Mechanical Engineering	Karatzas	Konstantinos	Professor	Faculty Member
31.	Mechanical Engineering	Michailidis	Nikolaos	Professor	Faculty Member
32.	Mechanical Engineering	Ntziachristos	Leonidas	Professor	Faculty Member
33.	Mechanical Engineering	Savvaidis	George	Professor	Faculty Member
34.	Mechanical Engineering	Skordaris	George	Professor	Faculty Member
35.	Mechanical Engineering	Vlachokostas	Christos	Associate Professor	Faculty Member
36.	Mechanical Engineering	Giagkopoulos	Dimitrios	Associate Professor	Faculty Member
37.	Mechanical Engineering	Diamantis	Vasilis	Associate Professor	Faculty Member
38.	Mechanical Engineering	Sterioudi	Fani	Associate Professor	Faculty Member
39.	Mechanical Engineering	Tapoglou	Nikolaos	Assistant Professor	Faculty Member

40.	Mechanical Engineering	Mauropoulos	Azarias	Laboratory Teaching Staff	Laboratory Teaching Staff
41.	Mechanical Engineering	Kompogiannis	Spyros	Laboratory Technical Staff	Laboratory Technical Staff
42.	Physics	Aggelakeris	Maroeidis	Professor	Faculty Member
43.	Physics	Arvanitidis	Ioannis	Professor	Faculty Member
44.	Physics	Vourlias	George	Professor	Faculty Member
45.	Physics	Gioti	Maria	Associate Professor	Faculty Member
46.	Physics	Delimitis	Andreas	Assistant Professor	Faculty Member
47.	Physics	Dimitrakopoulos	George	Professor	Faculty Member
48.	Physics	Kassavetis	Spyros	Assistant Professor	Faculty Member
49.	Physics	Katsiniki	Maria	Professor	Faculty Member
50.	Physics	Kexagias	Thomas	Professor	Faculty Member
51.	Physics	Kioseoglou	Iosif	Professor	Faculty Member

52.	Physics	laskarakis	Argyris	Associate Professor	Faculty Member
53.	Physics	Papaioannou	Eyaggelos	Assistant Professor	Faculty Member
54.	Physics	Patsalas	Panos	Professor	Faculty Member
55.	Physics	Sarafidis	Charalampos	Associate Professor	Faculty Member
56.	Geology	Kantiranis	Nikolaos	Professor	Faculty Member
57.	Chemical Engineering	Kikkinidis	Eystathios	Professor	Faculty Member